

OFFICE OF ENERGY PROGRAMS

PY 2021 ANNUAL REPORT



Department of
**Environment &
Conservation**



<http://www.tn.gov/environment/energy>

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OFFICE OF ENERGY PROGRAMS

The Tennessee Department of Environment and Conservation's Office of Energy Programs (TDEC OEP) provides education, outreach, technical assistance, and/or funding and financing opportunities for the following:

- energy efficiency;
- energy management;
- renewable energy;
- energy security planning, preparedness, and response;
- and energy in transportation.

OEP is comprised of two sections: the State Energy Office (SEO) and the State Facility Utility Management Section (SFUM). Through its activities, OEP promotes the efficient, effective use of energy to enhance the environmental and economic health of the state. Learn more about OEP at <http://www.tn.gov/environment/energy>.

ANNUAL REPORT REQUIREMENTS

Tenn. Code Ann. §§ 4-3-510(9) and 4-3-1012(b)(5) require TDEC OEP to submit annual reports to the Governor, the Speakers of the Senate and House of Representatives, and the Chair of the Senate and House Committees on government operations, energy, and conservation, or their successor committees. TDEC OEP's Program Year runs concurrent with the Federal Fiscal year; thus, this combined report covers the period from October 1, 2020 through September 30, 2021.



TENNESSEE'S STATE ENERGY OFFICE

TDEC OEP serves as the Governor-designated SEO for the State of Tennessee. The SEO is tasked with developing and overseeing energy-related programs and initiatives that promote a cleaner environment and a stronger economy. The SEO's activities fall into five main areas of focus: energy security planning, preparedness, and response; K-12 energy education; energy in transportation; clean energy financing; and stakeholder collaboration and outreach.

The SEO receives the majority of its funding from the U.S. Department of Energy (U.S. DOE) State Energy Program (SEP). SEP provides funding and technical assistance to states, territories, and the District of Columbia to enhance energy security, advance state-led energy initiatives, and maximize the benefits of decreasing energy waste.



Energy Security Planning, Preparedness, and Response

Pursuant to Tenn. Code Ann. §4-3-510, OEP has the duty and responsibility to “promote state and local energy emergency preparedness in coordination with other appropriate state agencies, such as the military department.” Subsequently, OEP is responsible for coordinating Emergency Support Function 12 – Energy (ESF-12) activities related to transportation and heating fuels under the Tennessee Emergency Management Plan to enhance Tennessee’s preparedness for disruptions to the state’s energy resources.

This work includes the ongoing management of the State’s Energy Security Plan, the Tennessee Petroleum Shortage Response Guidance, OEP’s Standard Operating Procedures checklists, and other energy emergency response reference materials, in cooperation with other State agencies and private industry stakeholders. (Tennessee’s strategic plans and operating procedures are often cited by U.S. DOE as good resources for other SEOs across the country to reference and emulate.) ESF-12 activities also require OEP staff to attend U.S. DOE energy emergency planning seminars, participate in training exercises, and serve as the primary ESF-12 Emergency Services Coordinators (ESCs) for the Tennessee Emergency Management Agency (TEMA). In addition, OEP staff members serve as the State’s Energy Emergency Assurance Coordinators (EEACs) for the U.S. DOE’s Office of Cybersecurity, Energy Security, and Emergency Response. Under this program, EEACs act as points of contact in each state during energy emergencies.

State Heating Oil and Propane Program

As participants in the U.S. DOE State Heating Oil and Propane Program (SHOPP), OEP collects weekly propane prices during the winter heating season from a random sample of propane distributors across the state. OEP shares this data with the Energy Information

Administration (EIA), which publishes the data regionally to assist both government and private sector entities with monitoring winter propane markets.¹

Energy Security Planning and Preparedness

- During Program Year 2020-2021, the Primary ESC worked with TEMA GIS staff to refine and improve power outage reporting as well as to develop an internal ESF-12 dashboard that includes 42 different layers from U.S. DOE and EIA to assist in tracking power outages in the future. Power outage tracking provides key data for decision-makers in the public and private sectors. The number of outages, as well as the estimated duration, impact the level of emergency response and length of recovery. Outage tracking is considered an essential element of information for local, State, and federal agencies to assess a community’s functionality during a disaster response. After all, electricity is essential for daily life. Basic functions, including communication, transportation, food, housing, water, and healthcare, are dependent upon it.
- The Tennessee Energy Security Plan was revised to include a major reorganization of reference data into separate annexes by fuel type. State Energy Profile information was also updated to reflect data published by EIA in 2021. The revised plan was officially adopted on November 21, 2021.
- The Primary ESC worked with TEMA Logistics staff to develop a new backup generator request electronic form. With this form, critical facilities operating on emergency power would now have a streamlined mechanism to request assistance via backup generators.

¹ EIA makes this data available through its Winter Heating Fuels website, which is updated weekly during the winter heating season (October 1 through March 31): <https://www.eia.gov/special/heatingfuels/#/US-TN:propane:week>. For additional information, EIA releases its “This Week in Petroleum” report every Thursday: <https://www.eia.gov/petroleum/weekly/index.php>.

- OEP participated in the inaugural State Mitigation Planning Committee meeting with the TDEC Office of Policy and Sustainable Practices, TDEC Office of Emergency Services, U.S. Army Corps of Engineers, TEMA Planning staff, and TEMA Mitigation staff. The organizing meeting developed goals to achieve enhanced mitigation status and to better share mitigation/resilience efforts across State government.

Energy Security Education and Outreach

The OEP Primary ESC served as Energy Security Committee co-chair for the National Association of State Energy Officials (NASEO) and co-hosted national webinars, reviewed NASEO documents, trained energy security staff in other states, participated in U.S. DOE's State Energy Security Training Working Group, and served as the State, Local, Tribal, and Territorial (SLTT) representative for FEMA's [Mitigation Framework Leadership Group](#) (MitFLG).

Additionally, OEP engaged in several awareness efforts on the topic of energy security:

- **Outreach:** OEP distributed an Energy Security Quarterly Newsletter to stakeholders in the public and private sectors. The newsletter shared data, case studies, and news items related to energy security, and included information on cybersecurity, EIA's short-term energy outlook, seasonal weather concerns, and more. OEP ESCs also prepared several articles on energy resilience for the TDEC Green Star Partnership quarterly newsletter, which was distributed to industrial and public sector stakeholders across the state.
- **Workshops:** OEP ESCs conducted energy security workshops and webinars on a variety of topics, including fuel supply, cybersecurity, hazard mitigation, energy data analysis, data use best practices, and the protection of critical infrastructure information during energy emergencies. The team worked with partners at TEMA, NASEO, U.S. DOE's Cybersecurity and Infrastructure Security Agency (CISA), and the Tennessee Department of Safety and Homeland Security to conduct these training sessions.
- **Stakeholder Education:** OEP also participated in targeted engagement and education activities, including the preparation and presentation of situation briefs for energy security stakeholders (e.g., TDEC, CISA, TEMA, Tennessee Department of Transportation [TDOT], and the Governor's Office) on the TN Energy Security checklist, TN Energy Security Plan, Petroleum Shortage Response Guidance, fuel supply chain, pending pipeline and terminal projects, and the State's response to the COVID-19 pandemic.

Energy Security Preparedness and Training Exercises

OEP ESCs participated in several training exercises and energy security briefings with industry personnel, including the following:

- The Vigilant Guard training exercise, hosted by TEMA and the Tennessee National Guard. The Primary ESC participated in this inaugural ESF Cyber tabletop exercise and briefed the U.S. Army North American Aerospace Defense Command (NORAD) Task Force Engineer on the topics of the Tennessee Valley Authority (TVA), Tennessee's electric grid, and power restoration practices for the state. The OEP ESCs tested the internal ESF-12 dashboard during the exercise.
- The U.S. Coast Guard tabletop exercise regarding a hypothetical oil spill in the Cumberland River.
- Multiple statewide tabletop exercises concerning COVID-19 and vaccine-related efforts.
- An annual State Emergency Operations Center (SEOC) training, including a TVA Nuclear Plant Integrated Training drill, TVA Nuclear Plant Emergency training, and a U.S. DOE Oak Ridge Reservation emergency exercise.
- ExxonMobil Pipeline Terminal tabletop exercises for the Nashville and Memphis terminals.

Emergency Response

Tennessee experienced another challenging year of disasters. February of 2021 began with over a week of below freezing temperatures and winter weather, which resulted in consistent closures across workplaces, schools, and roadways due to unsafe travel conditions. OEP worked with the Governor's Office to issue Executive Order 76, which declared an energy emergency to provide maximum flexibility for the energy sector in responding to the emergency. During this time, the Rutherford County Emergency Management Agency requested State assistance after an emergency communications tower lost power and its backup generator subsequently failed. The tower is a critical node in the statewide emergency communication network for law enforcement and first responders. A new backup generator was installed successfully but required refueling after prolonged use. A second wave of winter storms then knocked down several trees that blocked the access road to the emptying backup generator. OEP coordinated with TEMA Communications and the Tennessee Department of Forestry to provide chain saw crews to clear the road so that the generator could be refueled and could continue to support critical services in the area during the remainder of the emergency.

In March 2021, the Cumberland River flooded due to significant rainfall events. Fortunately, OEP had spent the preceding year working with TEMA to create a GIS map with petroleum terminal layers and flooding contours for the Cumberland River through Nashville. During these March floods, OEP used this resource and worked with the U.S. Corps of Engineers to keep the Cumberland River flooding below levels that would impact fuel terminals along the downtown Nashville corridor.

In May 2021, OEP managed the State's response to the Colonial Pipeline cyberattack and subsequent shut down. Over the course of the 16-day pipeline closure, the primary ESC provided the Governor's Office, TEMA

Director, and OEP Director with daily briefings, as well as provided statewide updates to county emergency management directors. The Primary ESC briefed the new U.S. Department of Transportation (U.S. DOT) Federal Motor Carrier Safety Administration (FMCSA) leadership and the U.S. DOT Secretary's Office to discuss a regional emergency declaration for the Southeast fuel sector. With the granting of an emergency declaration by FMCSA, Tennessee did not need to declare an energy emergency to secure an Hours of Service (HOS) waiver. The ability for the state to forgo the HOS waiver likely reduced the level of panic experienced in Tennessee over fuel shortages, despite the state's over-dependency on the Colonial Pipeline.

During the Colonial Pipeline response, OEP coordinated with TDEC Air Pollution Control to request a Reid Vapor Pressure (RVP) waiver from the U.S. Environmental Protection Agency (EPA) and coordinated with the Governor's Office and the TN Department of Agriculture on a State RVP waiver. OEP worked with the U.S. Coast Guard, the U.S. Army Corps of Engineers, and private sector oil companies to coordinate fuel barge deliveries under the cracked I-40 Memphis bridge and through the Cheatham Lock on the Cumberland River. A fuel barge, destined for Nashville to alleviate statewide fueling shortages, was the first vessel to pass under the Memphis bridge since its closure months before.


Vanderbilt University civil and environmental engineers later concluded that cities in Middle and East Tennessee with waterborne access to petroleum products were far less affected by the Colonial Pipeline disruption than were other regional markets. The research was conducted as part of a case study on resilience strategies for navigable portions of the Cumberland and Tennessee River system, and OEP's Primary ESC served as an advisor for the study.

Finally, in August 2021, OEP was activated again for catastrophic flooding in Humphreys, Hickman, and Dickson Counties, resulting from significant rainfall events. OEP ESCs helped to obtain diesel fuel for a hospital before its backup generator ran out of fuel. OEP ESCs also worked with the TN Propane Gas Association to address concerns regarding propane companies being cut off from transport in the affected counties.

OEP, leveraging its network of energy security and emergency response stakeholders, began coordinating donations from several private sector energy partners that were wanting to aid those affected by the flooding. First, a member of the Tennessee Propane Gas Association coordinated the delivery of a hot shower trailer from Atlanta to the Waverly Church of Christ—a church that had been housing 60 people whose homes were either destroyed or inaccessible due to flooding. Next, the Tennessee Poultry Association and its member Tyson sent 39,000 pounds of pre-cooked meat in refrigerated trailers to Humphreys County and allowed emergency response teams to use the trailers to store other food stuffs until the response ended. The Tennessee Fuel and Convenience Store Association also had four member companies donate at least five pallets of bottled water to the City of Waverly, which had a boil water notice in effect due to flood damage at its water treatment plant. Other OEP stakeholders sent out information on volunteer and donation opportunities to their members per OEP's request.

In all, OEP continues to serve as critical provider of energy security, preparedness, and response services to the state. As demonstrated in several of the events described above, OEP's stakeholder outreach and planning efforts help prepare Tennessee to better manage and mitigate energy emergencies, no matter how they start.





K-12 Energy Education

OEP has a long history of supporting K-12 Energy Education through professional development and student learning opportunities. OEP's offerings for the Program Year included virtual energy education workshops for both educators and students as well as continued support of the National Energy Education Development (NEED) Project. These offerings connect the broad topic of energy to science, technology, engineering, and math (STEM) subjects and provide educators and students with the knowledge and resources necessary to teach energy concepts.

OEP strives to provide energy education opportunities to schools across the state, prioritizing schools in economically distressed or at-risk counties (as defined by the [Appalachian Regional Commission](#)) and/or schools whose low-income student population is greater than 60% of the total student body (as determined using data from [greatschools.org](#)).

K-12 Energy Education Workshops & Outreach for Students and Educators

In response to the COVID-19 pandemic and the implementation of social distancing measures, OEP designed energy education curriculum for use in the online school setting. OEP continued its partnership with the Creative Discovery Museum in Chattanooga to offer virtual learning opportunities to Tennessee students. These virtual lessons were taught through a View It and Do It format, allowing teachers and students to experience exciting, hands-on energy lessons either in the classroom or at home. The View It and Do It format provided a video of science educators performing a variety of energy experiments (View It) and activity kits for students to use to conduct their own energy experiments after watching the lesson (Do It). Lesson offerings included the science of sound; forces and motion; electricity; and biofuels, bioenergy, and bioproducts. OEP also continued to partner with the Nashville-based Science Guys program to offer virtual learning opportunities to Tennessee students.

OEP hosted eleven virtual K-12 energy education events throughout Tennessee during the Program Year. The workshops were held virtually in response to social distancing practices. These combined energy education efforts reached more than 886 students and educators in eight counties, including six schools whose low-income student population is greater than 60% of the total student body.

In Program Year 2021, OEP reached:



886+

students and educators



8

counties

National Energy Education Development (NEED) Project

OEP is the State coordinator for the NEED Project, which promotes energy education among students, educators, and civic leaders through the design and delivery of energy education programs. NEED works with energy companies, government agencies, and community organizations to bring balanced energy programs to the nation's schools with a focus on strong teacher professional development, timely and balanced curriculum materials, signature program capabilities, and turn-key program management.

NEED honors schools across the country through its NEED Project Youth Awards for Energy Achievement, a competition in which teachers take their energy education programs beyond the classroom and encourage students to engage in school and community outreach to share what they have learned about energy efficiency and conservation. To participate in the NEED Youth Awards competition, schools compile their energy education activities for the year and submit an electronic scrapbook of their efforts. Tennessee's state winners are selected by OEP and are submitted for consideration at the national level. Tennessee schools have been recognized nationally every year since the program's inception.

In June 2021, Lipscomb Academy Lower School was named the 2021 NEED Project Youth Awards' State and National Primary School of the Year. Michie Elementary was recognized as a 2021 National Elementary Finalist. To view the Lipscomb "Green Team's" project, [click here](#). To view Michie Elementary's "Conservation of Energy" project, [click here](#). Learn more about the NEED Project Youth Awards [here](#).

“The video definitely got the students' attention and made them want more. Thank you so much for sharing these lessons with us.”

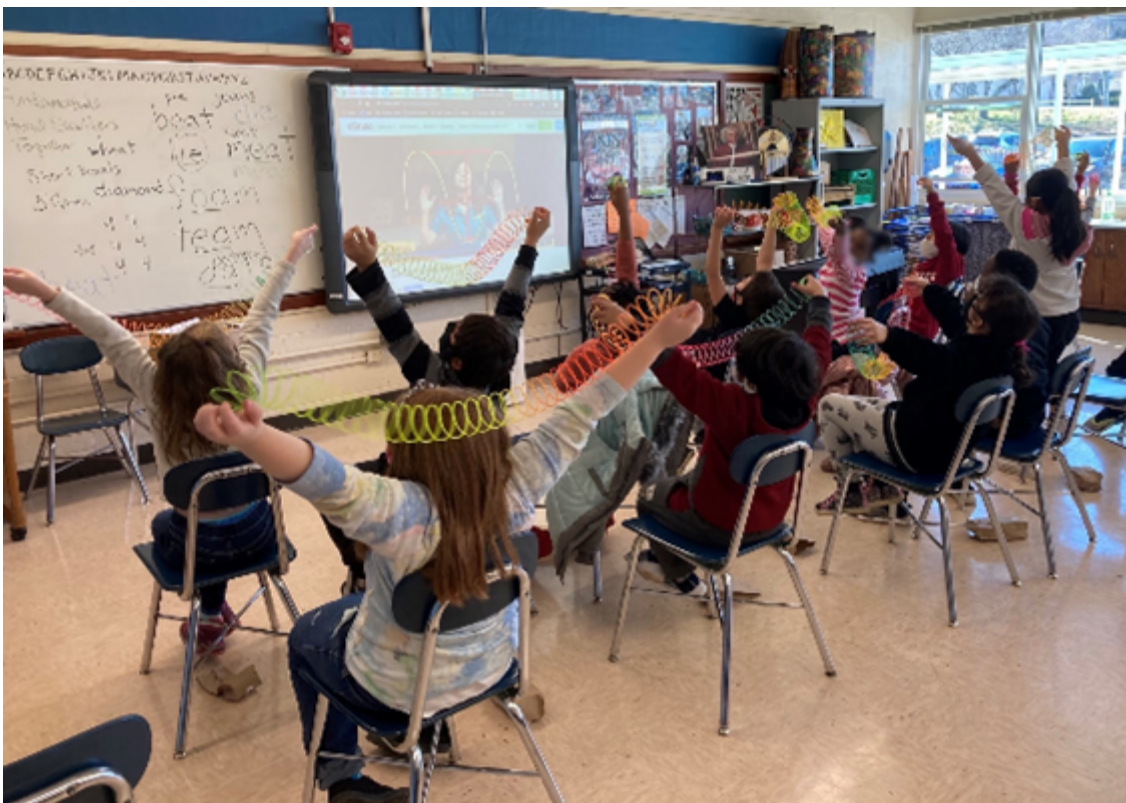
– Sequatchie Middle School



Students at David Crockett Elementary using activity kits as part of the View It Do It lesson format.

“These activities engaged the students and opened their eyes to new learning experiences that they would not have had access to without participating in this program.”

– David Crockett Elementary



Students at West Haven Elementary participating in an energy activity through a View it Do It lesson.



Energy in Transportation

According to EIA, the transportation sector is the largest energy consuming end-use sector in Tennessee, representing 30.7%² of Tennessee's total energy consumption in 2019.² To address this critical energy sector, OEP promotes and educates Tennessee citizens about alternative fuels, advanced vehicle technologies, and sustainable transportation options. By prioritizing and educating citizens regarding the aspects of energy use in transportation, OEP seeks to reduce energy costs within the transportation sector, increase the energy efficiency of the transportation sector, enhance resiliency and emergency preparedness through diversification of available fuels, and promote economic growth with improved environmental quality.

Tennessee Sustainable Transportation Forum & Expo (STF&E)

STF&E is an annual conference, coordinated and hosted by OEP, TDOT, the TDEC Office of Policy and Sustainable Practices, the TDEC Office of External Affairs, and the East Tennessee Clean Fuels Coalition. STF&E allows attendees to share and discover projects that can reshape what is possible in transportation and mobility. The research, technology, planning, and policy developments shared at STF&E aim to improve transportation efficiency, reduce vehicle emissions, and address the mobility needs of all. Panelists and speakers from across the country highlight best practices to transform transportation systems efficiently, affordably, and sustainably. Learn more about STF&E at www.sustainabletransportationforum.com.

In 2020, STF&E was held as a free, four-part webinar series throughout October and November. These webinars focused on the following topics:

- **Freight Transportation and Logistics:** What are the short-term and long-term expectations for the growth of freight transportation? What transportation modes and markets are most heavily impacted, and what are the responsibilities of different actors (e.g., State government, private industry, personal consumers, etc.) when trying to make freight transportation more sustainable? The experts on this panel answered these questions and more in a dedicated discussion on freight transportation in Tennessee.
- **Rural Transportation and Mobility:** Rural travelers may encounter mobility challenges specific to their communities, including limited pedestrian or biking infrastructure, lack of exposure to alternative fuels and advanced vehicle technologies, increased trip mileage, increased rate of mortality in transportation collisions, and more. How can sustainable transportation projects help address these challenges? STF&E panelists discussed these considerations and how rural sustainable transportation initiatives can succeed in Tennessee.
- **Resiliency in Transportation:** The state's transportation system needs to be resilient and recoverable to allow for safe travel after extreme weather events, major accidents, equipment or infrastructure failures, and other impediments to normal transportation function. The experts on this panel examined sustainable transportation resilience through the lens of climate adaptation, cybersecurity, transportation planning, and more.

2. Energy Information Administration, "Tennessee State Profile and Energy Estimates." Accessed on April 30, 2022. <https://www.eia.gov/state/?sid=TN>.

- **Sustainable Transportation Excellence in Tennessee:** The final STF&E webinar featured a digital “fireside chat” between TDEC Commissioner David Salyers and TDOT Commissioner Clay Bright, moderated by Deputy Commissioners Greg Young of TDEC and Preston Elliott of TDOT. Speakers highlighted exceptional mobility projects from across the state’s diverse geographies and communities, as well as several State-organized resources, programs, and tools that support transportation efficiency, safety, and accessibility for all Tennesseans. This includes the presentation of the 2020 Tennessee Sustainable Transportation Awards (TSTAs).

Hosted by TDEC and TDOT, the TSTAs recognize outstanding initiatives to improve the efficiency, accessibility, affordability, and sustainability of transportation systems in the state, consistent with ongoing efforts to improve the health and well-being of Tennesseans, provide for a strong economy, and protect the state’s natural resources. Summaries of the award-winning projects can be accessed here: <http://www.tn.gov/environment/TSTA>.

Over 330 people attended this four-part webinar series in 2020. These webinars were recorded and have since been posted on the STF&E website for public reference.

Middle-West Tennessee Clean Fuels

U.S. DOE's Clean Cities program advances the nation's economic, environmental, and energy security by working locally to advance affordable, domestic transportation fuels and technologies. A national network of nearly 100 Clean Cities Coalitions brings together stakeholders in the public and private sectors to deploy alternative and renewable fuels, idle-reduction measures, fuel economy improvements, and new transportation technologies, as they emerge. In Tennessee, there are two U.S. DOE-designated Clean Cities Coalitions: the Middle-West Tennessee Clean Fuels Coalition (MWTCF) and the East Tennessee Clean Fuels Coalition (ETCF). The website for these two Coalitions, known collectively as Tennessee Clean Fuels, may be accessed at <http://www.tncleanfuels.org/>.

As Coordinator for MWTCF, OEP provides technical assistance and targeted outreach, within the Coalition’s territory, to raise awareness and foster a greater understanding of alternative fuels and advanced vehicle technologies. Additionally, OEP tracks, validates, analyzes, and reports on critical information and performance metrics necessary to gauge consumer acceptance and track the growth/adoption of technologies and practices in the marketplace.



In compliance with eligible activities and U.S. DOE grant deliverables, OEP staff conducted the following key activities on behalf of MWTCF:

- Identified and tracked alternative fuel station opening and closing information and kept U.S. DOE abreast of any refueling site openings, closings, and status changes;
- Organized several stakeholder meetings and events to disseminate Clean Cities and alternative fuel vehicle information;
- Filmed and distributed alternative fuel vehicle and associated emissions reduction calculation videos, both for use in the K-12 classroom as well as for education of the general public via a newly launched [Fuels Flix Alternative Fuels Library](#);
- Conducted targeted outreach to fleets, fuel providers, and consumers regarding the use of alternative fuel vehicles and advanced vehicle technologies.

Annual Reporting to U.S. DOE

Each year, MWTCF reaches out to fleets and alternative fuel stations that the Coalition has engaged with or supported during the year to request data on alternative fuel usage and/or sales; data is then compiled and submitted in an Annual Progress Report to U.S. DOE. This report was completed in April of 2021 and covers activity by 30 fleets and 14 fueling station owners in Middle-West Tennessee for calendar year 2020. Key findings from this report are shown in the figures below.

MWTCF's Calendar Year 2019 Impact:



Tennessee State Parks Alternative Fuel Strategy

In 2021, MWTCF worked with Tennessee State Parks (TSP) leadership and the TN Department of General Services Division of Vehicle and Asset Management (DGS VAM) to develop a five-year alternative fuel strategy for the TSP fleet. TDEC leadership has been very receptive of the plan and has made steps to implement the strategy document's recommendations for advancing alternative fuels use within TSP. At a high-level, the final plan recommended the following:

- MWTCF identified approximately 50 flex fuel vehicles (FFVs) currently operating in State Parks that are located within 10 miles of a publicly available E85 station. (For reference, FFVs are capable of operating on ethanol, a biofuel, at blends of up to 85% ethanol / 15% gasoline, also known as E85.) For these FFVs, TSP will consider the following stepped goals below:

- By June 30, 2024, the overall fuel consumption of FFVs that are 10 miles or closer to public E85 stations should comprise 25% E85.
- By June 30, 2027, the overall fuel consumption of FFVs that are 10 miles or closer to public E85 stations should comprise 50% E85. Reaching this goal of 50% E85 consumption for FFVs at the State Parks listed above would decrease these vehicles' greenhouse gas (GHG) emissions by around 17% annually.
- By the end of 2022, establish vehicle usage patterns that lend themselves well to electric vehicle adoption. Such vehicle usage patterns should be high mileage, to help with return on investment, while still producing predictable daily driving and fueling use activity within the range of the replacement electric vehicles in question (i.e., targeting high mileage vehicles whose daily use falls within the battery range of the target replacement vehicles/whose daily use allows for charging during the day). To do this, establish a reporting mechanism to track TSP vehicles' driving patterns and refueling rates. Collect data over a period of three to six months to account for changes in driving behavior throughout the year.
 - Using the data gathered above, identify vehicle use cases that lend themselves as suitable for electric vehicle replacement (e.g., regional manager vehicles, ranger vehicles, etc.). Vehicles of these types will be hereafter referred to as Electric Candidate Vehicles. In addition, identify parks that may have fleets comprised of a high number of Electric Candidate Vehicles in order to determine locations best suited for near-term fleet electrification as well as dedicated fleet charging installation.
 - Through June 30, 2024, replace 50% of Electric Candidate Vehicles leaving service with commercially available EVs that fit the TSP streamlined use cases (e.g., SUVs, minivans, pick-up trucks, box trucks, and transit vans).
 - Through June 30, 2027, replace 100% of Electric Candidate Vehicles leaving service with commercially available EVs that fit the TSP streamlined use cases (e.g., SUVs, minivans, pick-up trucks, box trucks, and transit vans).

Arcimoto EV Ride and Drives

In coordination with Tennessee Clean Fuels and Drive Electric Tennessee, Oregon-based Arcimoto hosted a series of electric vehicle demonstrations and ride and drives in Tennessee. The group held events in Memphis, Nashville, Chattanooga, and Knoxville that allowed attendees to learn about and test drive two different models of Arcimoto all-electric vehicles. These three-wheel, small footprint vehicles are built to maximize efficiency and can be used for rapid response / emergency services, last mile delivery, or as fun utility vehicles.

The events were well-attended by representatives from a variety of sectors, with approximately 45 attendees at the Memphis event and 35 at the Nashville event, both of which were organized by MWTCF. (The events in Chattanooga and Knoxville were managed by ETCF.) Attendees included those from local government (e.g., City of Memphis/Shelby County, City of Clarksville, Metropolitan Government of Nashville and Davidson County), State government agencies (e.g., Tennessee Department of Economic and Community Development, TDOT, TDEC), emergency services (e.g., Vanderbilt Police, Middle Tennessee State University Police, City of Memphis Police), universities (e.g., Vanderbilt University), non-profits (e.g., Sierra Club, The Family Center), utilities (e.g., TVA, Brownsville Utilities Department), and private companies (e.g., FedEx, LightWave Solar, Blink Charging). Approximately 30 drives were provided during each of the two-hour events. This collaboration with Arcimoto has opened up opportunities to interact with interested small footprint vehicle stakeholders. MWTCF's engagement with these stakeholders will further expose them to electric vehicles and possible applications for their own fleets.



(Left): Attendees view an EV at a Tennessee State Parks and Rivian event.
 (Center & Right): Representatives from a variety of sectors test drive and learn about two Arcimoto all-electric vehicles at ride and drive events held throughout Nashville.

Volkswagen Diesel Settlement

In 2015, Volkswagen (VW) publicly admitted that it had secretly and deliberately installed a defeat device—software designed to cheat emissions tests and deceive federal and state regulators—in approximately 590,000 model year 2009 to 2016 motor vehicles containing 2.0 and 3.0 liter diesel engines. Under the ensuing Volkswagen Diesel Settlement (VW Settlement) First and Second Partial Consent Decrees, VW has agreed to: (1) dedicate \$10 Billion to the recall of at least 85% of the affected 2.0 and 3.0 liter vehicles; (2) invest \$2 Billion in zero-emission vehicle infrastructure and promotion (“Zero Emission Vehicle Investment Plan”); and (3) establish a \$2.9 Billion Environmental Mitigation Trust (EMT) to mitigate the environmental effects of the excess nitrogen oxide (NOx) emissions from the affected vehicles.

In October 2017, the Court approved two Trust Agreements for Beneficiaries of the EMT: one for the 50 states, the District of Columbia, and the Commonwealth of Puerto Rico (“State Trust Agreement”), and one for the separate allocation for federally recognized Indian tribes in the U.S. The State’s initial allocation under the State Trust is \$45,759,914.40.

Following the designation of TDEC as the Lead Agency for purposes of administering the State’s VW EMT allocation, TDEC formed a multidisciplinary Technical Advisory Committee (TAC) to develop a Beneficiary Mitigation Plan (BMP). The TAC is comprised of representatives from the following TDEC divisions: Air Pollution Control; OEP; OPSP; OEA; and the Office of General Counsel (OGC). On September 21, 2018, TDEC released a final BMP for implementing the State’s initial allocation under the EMT. The BMP noted TDEC’s plans to release separate project solicitations in the following order for each of the environmental mitigation action (EMA) categories that it has selected to fund, with percent of initial total funding allocation noted:

- (1) Class 4-8 School Buses (~20%);
- (2) Class 4-8 Shuttle and Transit Buses (~40%);
- (3) Class 4-7 Local Freight Trucks (15%), Class 8 Local Freight Trucks and Port Drayage Trucks (10%); and
- (4) Light Duty Zero Emission Vehicle (ZEV) Supply Equipment (15%)

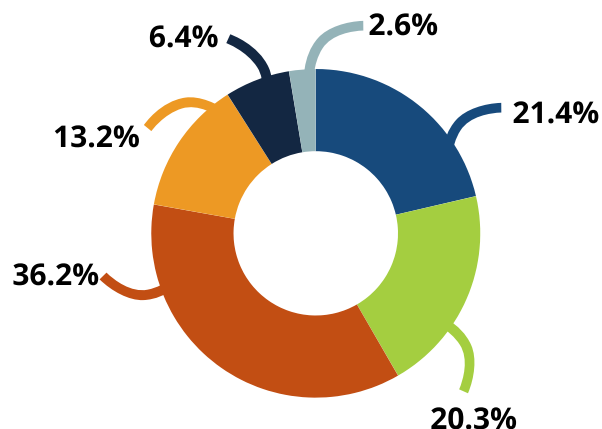
The State’s BMP targets the largest contributors of mobile NOx emissions in Tennessee, including the on-road, diesel heavy duty sector and the on-road, non-diesel light duty sector. As NOx emissions contribute to the formation of ozone and particulate matter, reductions in emissions will assist in the State’s efforts to maintain compliance with the National Ambient Air Quality Standard (NAAQS) for Ozone and Particulate Matter.

As of September 2021, OEP had obligated nearly \$24 million in VW Settlement EMT funding to 67 school bus, shuttle bus, transit bus, medium truck, and large truck grantees in Tennessee. Overall, 64% of funds have

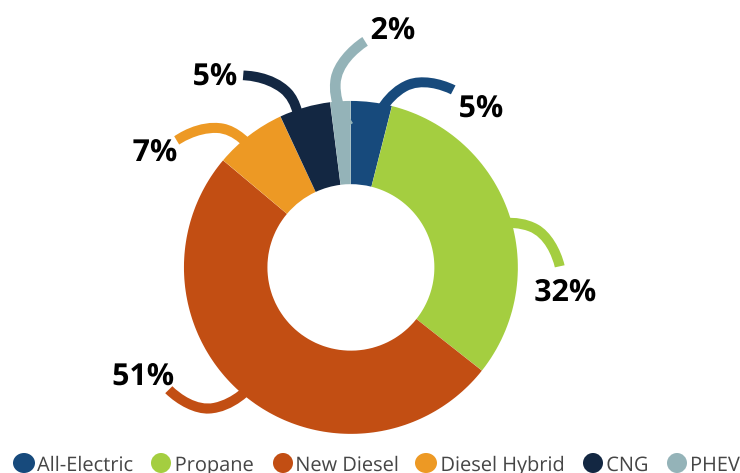
been obligated to alternative fuel vehicle projects, including propane, compressed natural gas (CNG), and electric. Additional funding obligations and grant programs will be announced in 2022.

VW Settlement EMT Funding Breakout in Tennessee

Total Funding Obligated by Fuel Type



Number of Vehicle Replacements by Fuel Type



Learn more about the VW Settlement at <http://www.tn.gov/environment/VWSettlement>.
Access the State’s BMP at http://www.tn.gov/environment/VW_BMP.

School Bus Replacement Grant Program

Launched in the fall of 2018, the VW Settlement EMT School Bus Replacement Grant Program provides funding to selected projects that replace eligible diesel school buses with new diesel, alternate-fueled, or all-electric vehicles. Thirty-five grantees were selected to replace a total of 134 engine model year 2009 or older school buses with 65 new diesel, one all-electric, 65 propane, and three CNG school buses. These projects are expected to yield NOx emissions reductions of an estimated 111,542 pounds, or 55.77 tons, over the lifetime of the new vehicles. By early 2022, OEP

reimbursed nearly \$8 million in grant funding to school bus grantees that have successfully purchased and put into service qualifying vehicle replacements. All projects funded under this Grant Program are now considered complete.

Of the school buses to be funded by the VW Settlement EMT, 26 operate 70% or more of the time in former nonattainment areas for ozone and/or fine particulates (PM2.5) NAAQS; 42 operate in State FY 2019 economically distressed counties (as defined by the [Appalachian Regional Commission](#)).



School Bus Replacement Grant Program:

\$8,205,276.94

total funding provided under the School Bus Replacement Grant Program in Tennessee



35
grantees selected



111,542

anticipated pounds of NOx emissions to be reduced over the life of all funded school bus replacement projects



134
school buses to be replaced

Transit and Shuttle Bus Grant Program

In September 2019, TDEC released its second solicitation for projects under the VW Settlement EMT to replace transit and shuttle buses with new alternate-fueled or all-electric vehicles. In May 2020, TDEC announced that three major transit providers in Tennessee would receive funding to replace a total of nine engine model year 2009 or older diesel transit buses with six all-electric and three diesel-hybrid vehicles. These projects are expected to yield NOx emissions reductions of an estimated 17,027.46 pounds, or 8.51 tons, over the lifetime of the new

vehicles. The nine transit buses funded will operate 70% or more of the time in former nonattainment areas for ozone and/or PM2.5 NAAQS and will collectively travel more than 400,000 miles each year.

By the end of the Program Year, OEP reimbursed more than \$1.6 million in grant funding to transit bus grantees that have successfully purchased and put into service qualifying vehicle replacements. OEP will reimburse approximately \$4 million more in grant funding under this program in the coming Program Years.

Medium and Large Truck Grant Programs

In August 2020, TDEC released additional solicitations for projects under the VW Settlement EMT for the replacement of eligible class 4-7 local freight truck (medium truck) projects and class 8 local freight truck and port drayage truck (large truck) projects. The grant programs would provide financial assistance to public, non-profit, and private fleets in Tennessee that replace and/or repower eligible medium and large trucks with new diesel, alternate fueled, or all-electric trucks and/or drivetrains. In April 2021, TDEC announced the selection of 25 entities to receive approximately \$3.8 million for medium truck projects and \$5.8 million for large truck projects across the state—nearly \$10 million in all.

For the Medium Truck Grant Program, selected awardees will replace a total of 35 engine model year 1992-2009 diesel trucks with 10 new diesel, two all-electric, 14 hybrid, one CNG, and eight propane trucks. These selected medium truck replacement projects are expected to reduce 22,561.47 pounds, or 11.28 tons, of NOx emissions over the lifetime of the new vehicles, with a vehicle cost-effectiveness rating of \$166.44 per pound of NOx reduced.

For the Large Truck Grant Program, selected awardees will replace a total of 46 engine model year 1992-2009 diesel trucks with 37 new diesel, one all-electric, one hybrid, and seven compressed natural gas trucks. These selected large truck replacement projects are expected to reduce 39,353.78 pounds, or 19.68 tons, of NOx emissions over the lifetime of the new vehicles, with a vehicle cost-effectiveness rating of \$146.85 per pound of NOx reduced.

Of the funded vehicle replacements, 63 trucks will operate 70% or more of the time in former nonattainment areas for ozone and/or PM2.5 NAAQS. Twenty-eight funded trucks will operate in counties that bear a disproportionate share of the air pollution burden (determined by TDEC's Disproportionate Burden Index). Additionally, six funded trucks will operate in two of the state's FY 2020 economically distressed counties (as defined by the [Appalachian Regional Commission](#)), supporting local government and business economies by offsetting the cost of new and cleaner vehicle and transportation technologies.

OEP will begin processing reimbursements for these programs within the coming Program Years, after grantees have purchased and put into service qualifying vehicle replacements.

Fast Charge TN Network Grant Program

TDEC and TVA are partnering to develop a statewide electric vehicle fast charging network to power the growth of electric vehicles across Tennessee and reduce barriers to transportation electrification. Specifically, [the two have signed an agreement](#) to collaborate and fund a network of fast charging stations every 50 miles along Tennessee’s interstates and major highways. The “Fast Charge TN Network” will add approximately 50 new charging locations along prioritized [corridor infrastructure gaps](#), tripling Tennessee’s existing fast charging network. For reference, by the end of Program Year 2020-2021, there were only 23 fast charging locations currently operating in Tennessee that were open to all consumers and supported both charging standards common to electric vehicles.

TDEC and TVA will leverage various funding sources to support the development of the fast charging network with an anticipated total project cost of \$20 million. This partnership advances the State’s goal of establishing a statewide corridor fast charging network that improves transportation efficiency, reduces vehicle emissions, promotes electric adoption, and strengthens the resiliency of our transportation network. TDEC has committed 15%, the maximum allowable, of its VW EMT allocation to fund light-duty electric vehicle charging infrastructure. Approximately \$5.2 million from this fund is expected to be allocated to fast charging infrastructure along corridors. The remainder of the project will be funded by TVA, other program partners, and program participant cost share.

In the fall of 2021, TDEC and TVA began seeking project proposals from TVA-served Local Power Companies (LPCs) and other local utilities that distribute electricity in Tennessee whose service territory is located along prioritized corridor gaps (eligible applicants) to develop the Fast Charge TN Network across Tennessee. TDEC and TVA expect to announce selected funding recipients for the Fast Charge TN Network Grant Program within the next Program Year.

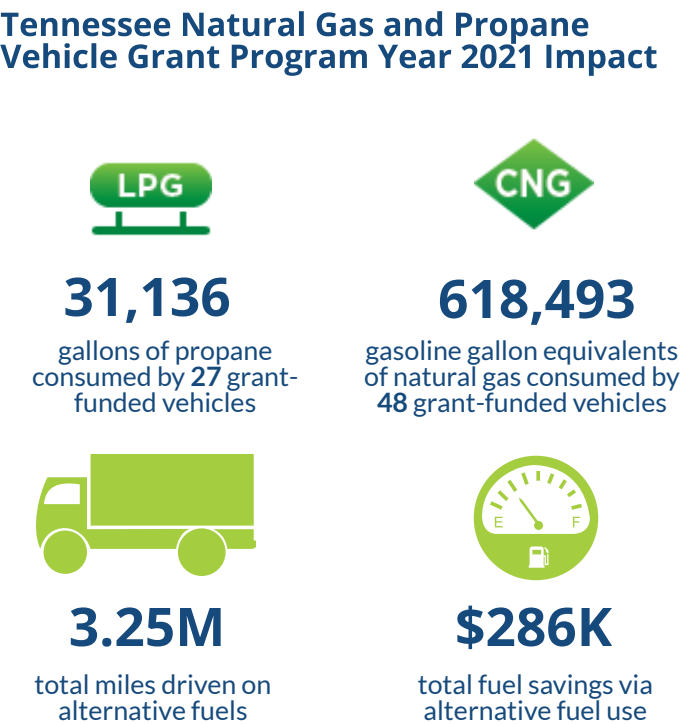
Tennessee Natural Gas and Propane Vehicle Grant Program

Launched in the fall of 2016, the Tennessee Natural Gas and Propane Vehicle Grant Program provided grant funding to minimize the incremental cost of more than 80 alternative fuel vehicle purchases and/or conversions. The Program incentivized the investment in and operation of natural gas or propane-powered light, medium, and heavy-duty vehicles by public, nonprofit, and private fleets in Tennessee. Grantees from the first and second rounds include the following organizations:

- Knoxville Utilities Board purchased three dedicated natural gas Freightliner M2 112 trucks
- Piedmont Natural Gas purchased six dedicated natural gas Freightliner M2 112 trucks and three dedicated natural gas Freightliner M2 trucks

- Sevier County Utility District purchased three dedicated natural gas trucks, including a Ford F650 dump truck, an F450 truck, and a Kenworth T880 refuse hauler and five bi-fuel natural gas Ford F-250 trucks
- United Parcel Service, Inc. purchased twelve dedicated natural gas Kenworth T680 trucks
- City of Kingsport converted twenty bi-fuel propane Dodge Chargers
- City of Parsons purchased five dedicated natural gas trucks, including Ford F-150 and F-250 models
- Great Smoky Mountains National Park converted six dedicated propane trucks, including Ford F-150, F250, F-350, F-450, and Ranger models
- Greater Dickson Gas Authority purchased one dedicated propane Freightliner S2G, one bi-fuel propane Ford F-350, four bi-fuel natural gas trucks (including Ford F250 and F350 models), and two dedicated natural gas Ford F750 dump trucks
- Waste Management purchased seven dedicated natural gas trucks, including Autocar ACX64 and Peterbilt 356 models

Throughout Program Year 2020-2021, OEP continued to manage first and second round grant contracts under this program, which included the final disbursement of grant funding, oversight and coordination of grantee reporting, and the implementation of desktop and follow-up onsite monitoring visits of grant recipients to verify reported metrics and to ensure that grant recipients are still maintaining and managing the inventory of all property purchased/converted with grant funding.



Drive Electric Tennessee

Throughout 2018, a team of Tennessee stakeholders—including State agencies (such as TDEC OEP), utilities, local governments, universities, research institutions, electric vehicle manufacturers, businesses, and advocacy groups—developed a shared vision for electric transportation in the state. Together, these stakeholders comprise [Drive Electric TN \(DET\)](#), whose goal is to increase electric vehicle adoption in Tennessee from approximately 17,000 electric vehicles in 2021 to 200,000 vehicles by 2028.³ In January 2019, DET released the first edition of its [Electric Vehicle Roadmap](#), which identifies “Opportunity Areas” that will increase electric vehicle adoption across multiple Tennessee use cases and sectors.

Three Opportunity Area committees have since been launched to address various projects and initiatives highlighted in the Roadmap: Charging Infrastructure Availability, Policies and Programs, and Awareness. Each of these Opportunity Areas are co-chaired by OEP and MWTCF personnel, who guide and oversee DET efforts to complete projects that promote electric vehicle adoption. The lists that follow note the committees’ accomplishments and priorities for Program Year 2020-2021:

- **Charging Infrastructure Availability:** 1) publication of a Statewide Electric Vehicle Charging Infrastructure Needs Assessment; 2) evaluation of funding opportunities and ownership models to support implementation of a public, statewide electric vehicle charging network; and 3) development of guides for charging station site hosts and site selection, including information on site prep, charging station installation, and planning for ongoing charging station operation.

- **Policies and Programs:** 1) creation of a Local Action Plan video series, for use by local governments seeking to accelerate transportation electrification; 2) development of an Electric Vehicle Workplace Charging Infrastructure Best Practices Guide, for use by Tennessee employers; and 3) creation of a statewide E-VIP or electric vehicle tourism program to connect electric vehicle drivers with electric-friendly driving routes and destination chargers.
- **Awareness:** 1) creation of electric vehicle charging station signage recommendations; 2) compilation of electric vehicle case studies for a variety of fleet types and applications; 3) promotion of a robust DET social media and website presence; 4) coordination of EV Chapters across Tennessee, to serve as local resources for electric vehicle education; and 5) development of educator training programs, both for electric vehicle ride and drive training as well as electric vehicle dealership education.

Electric vehicle stakeholder engagement is at a historic high for Tennessee, with multiple organizations partnering on promotion of electric vehicle awareness activities as well as on build out of a suite of electric vehicle related resources. DET and partners will continue to address the above-mentioned priorities and projects in 2022. For more information on DET, visit www.DriveElectricTN.org.

3. As of Q4 2021, there were approximately 17,000 electric vehicles registered in Tennessee. This number is provided to OEP by the Tennessee Department of Revenue on a quarterly basis, based on actual vehicle registration data for the state.





Clean Energy Financing

Energy Efficiency and Renewable Energy Loan Program

The Pathway Lending Energy Efficiency Loan Program (EELP), a low-interest revolving loan fund, was launched in 2010 to assist Tennessee for-profit and not-for-profit commercial and industrial businesses in implementing energy efficiency and renewable energy improvements. In January 2016, EELP was expanded to offer financing to local government entities, including municipalities, counties, school districts, and other public agencies. Pathway Lending, a US Treasury certified community development financial institution, oversees the \$29 million revolving loan fund, which is comprised of loan capital provided by the State / TDEC OEP (\$14 million), TVA (\$10 million), and Pathway Lending (\$5 million). Eligible projects under EELP include, but are not limited to: energy efficient equipment upgrades; lighting; building envelope retrofits; cool roofs; renewable energy installations; and co-generation. Five-year term energy efficiency loans have a fixed interest rate of 2%, and ten-year term renewable energy loans have a fixed interest rate of 5%. Local government entities are eligible to receive up to six years of financing at a 2% interest rate for qualified energy efficiency and renewable energy projects. Qualifying entities can apply for loans between \$20,000 and \$5 million. EELP obligated approximately \$5.1 million in new loans to 23 Tennessee businesses and organizations during the Program Year, with an average estimated annual energy savings of \$18,455 per program participant.

Home Uplift Program

Over the past two decades, new electric technologies, appliance standards, and increased energy efficiency requirements in state and local building codes have dramatically lowered residential energy consumption and increased the comfort and health found in family homes across the Tennessee Valley. Unfortunately,

these benefits have flowed primarily to homeowners with the disposable income to take advantage of technological advances in energy efficiency and the utility programs that promote their use.

Residents in the Southeast face historically high rates of poverty, and low-income families often live in homes that are inefficient, uncomfortable, and, in many cases, unhealthy for occupants. Despite TVA's low residential energy rates ranking in the top quartile nationally, disproportionately high electricity usage represents an even greater burden to low-income families who spend a greater proportion of their resources on electricity. Energy efficiency and weatherization measures can help to lower energy bills for low-income households, and such have also been proven to improve indoor air quality, safety, and comfort, thereby positively impacting human health.

(Left) A resident's window before Home Uplift.
(Right) A resident's window after going through the Home Uplift program.



TVA created the Home Uplift Program to address the significant energy efficiency and weatherization needs for low-income households in Tennessee and across the Tennessee Valley. OEP has since leveraged TVA's Home Uplift Program and partnered with LPCs to invest in the vision to create a sustainable, quality program to increase energy efficiency weatherization for low-income families in Tennessee. In Program Year 2020-2021, OEP provided grants totaling \$3 million to the Electric Power Board of Chattanooga (EPB), the Knoxville Utilities Board (KUB), Memphis Light Gas & Water (MLGW), and Nashville Electric Service (NES) to extend the reach of their respective Home Uplift Programs. This funding is being used to cover the costs of energy efficiency and weatherization measures for limited income homeowners that are customers in these LPCs' respective electricity service areas.

Customers who qualified for the Home Uplift Program received valuable energy efficiency upgrades. In addition to saving money on their energy bills, participants also reported improvements in the comfort and air quality of their homes. OEP and the LPCs worked to complete upgrades to 137 homes. The energy efficiency upgrades have included 444 window replacements, 77 door replacements, 67 HVAC cleaning and tuning/replacements, 55 attic insulation repair/replacements, 52 duct sealing/replacements, 54 air sealing repairs, 27 heat pump water heaters, 14 refrigerators, and 694 LED bulbs. OEP anticipates all Home Uplift projects to be completed within the next Program Year.

“I am amazed at how much the upgrades have affected the quality and comfort of my life as well as the monthly savings.”

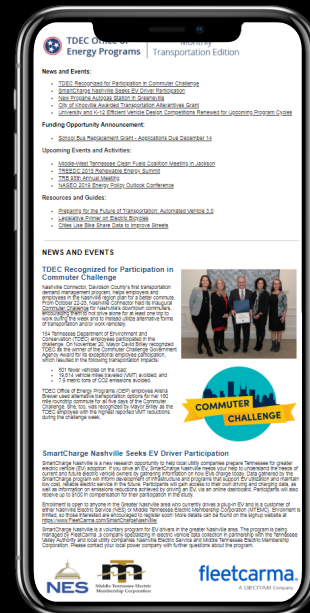
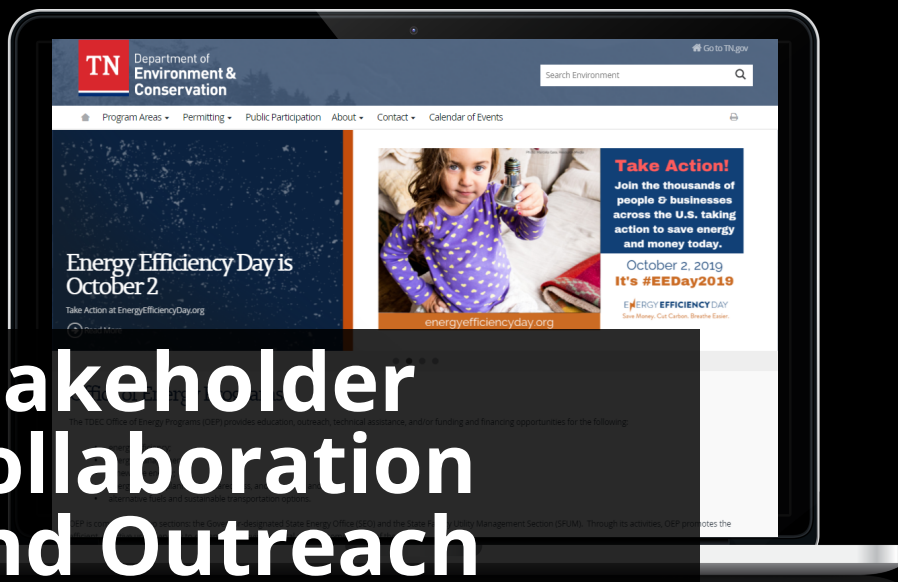
- Chattanooga Homeowner Deirdra Chambliss

“Home Uplift has changed my whole life and quality of living.”

- Chattanooga Homeowner Sabrina Anderson



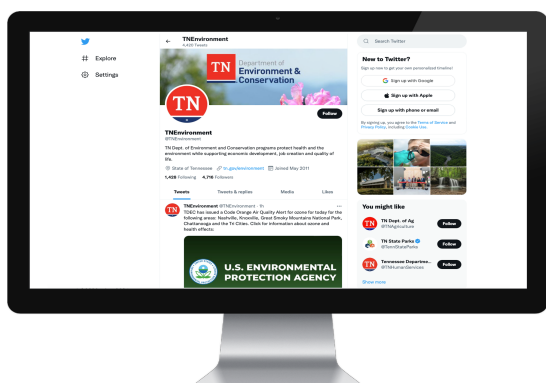
Stakeholder Collaboration and Outreach



Communications

OEP curates and distributes two monthly newsletters, the Energy Edition and the Transportation Edition. These monthly newsletters are disseminated to a listserv of over 5,000 stakeholders and serve as the primary vehicle for OEP to announce timely news items, upcoming events, funding opportunities, and new resources. Additionally, OEP develops and maintains its own web content and continually improves the functionality of its website to create a better user experience. Visit OEP's website at <http://www.tn.gov/environment/energy>.

OEP also works with communications partners to share energy-related content via social media, reaching individuals that may not already be subscribed to OEP's mailing list. One partner, TDEC Communications, manages TDEC's Twitter and Facebook accounts (@TNEnvironment). The accounts have 4,700 and 9,000 followers, respectively. Another partner, Tennessee Clean Fuels, maintains a social media presence on Twitter, Facebook, and Instagram (@TNCleanFuels), reaching approximately 3,000 additional followers. OEP pitches energy and transportation content to both partners for inclusion on their separate platforms.



In accordance with Tenn. Code Ann. §4-3-501(3), OEP is responsible for providing "information and educational programs for local governmental units and the general public, including the operation of a toll-free energy hotline." As such, OEP maintains an updated overview of its programs on the OEP website and provides technical assistance to internal and external customers by responding to energy-related inquiries received via email or through OEP's energy hotline. During the Program Year, OEP handled nearly 250 requests from the residential, government, utility, commercial, industrial, institutional, and other sectors for energy-related information and resources. These general requests for technical assistance are in addition to inquiries that OEP received regarding its specific programs and activities.

Interagency and Nonprofit Collaboration

A key component of OEP's outreach strategy is the multi-faceted work that stems from cooperation with external partners and organizations. OEP collaborates with various stakeholders to support the execution of targeted outreach and improved programs across the residential, commercial, industrial, and public energy sectors. Key activities during the Program Year include the following:

- OEP worked with State agencies, educational institutions, and other entities to research, gather information, and prepare a response to the American Council for an Energy Efficient Economy's (ACEEE) request for information related to the organization's [2021 State Scorecard](#). To determine states' reports for the Scorecard, ACEEE considered three policy areas in which states typically pursue energy efficiency: equity in energy efficiency and clean energy workforce development; building energy policies; and appliance standards.

- The State Energy Efficiency Scorecard 2021 Progress Report was released on February 2. The report recognized Tennessee for enacting updates to its statewide energy code in 2020 to the 2018 International Energy Conservation Code (IECC). The state was also singled out as a leader by example in ensuring that energy efficiency and clean energy investments and opportunities are inclusive and that benefits accrue to all customers, especially households overburdened by energy costs.
- OEP supported the development of the [2021 U.S. Energy and Employment Report \(USEER\)](#), which was compiled by NASEO, the Energy Futures Initiative, BW Research, and MG Strategy and Design. Since its initial publication in 2016, the annual USEER survey and analysis supplement federal Bureau of Labor of Statistics data to account for evolving energy market business models and to provide an independent, data-driven account of energy jobs in power generation and fuels; transmission, distribution, and storage; energy efficiency; and motor vehicles, including alternative fuel vehicles.
- OEP supported and cross-promoted the work of the Tennessee Advanced Energy Business Council (TAEBC), which champions advanced energy as a job creation and economic development strategy. OEP shared information with its stakeholders on TAEBEC's ongoing events, resources, and programming, helping draw attention to TAEBEC and its mission in Tennessee.

OEP also participated in or supported collaborative applications to major U.S. DOE funding opportunities. With OEP's involvement, these applications leveraged stakeholder partners, diverse cost share commitments, and the state's strong research community to bring new, innovative energy programs to Tennessee.

One example of this would be OEP's submission of an application in response to U.S. DOE's Building Technologies Proving Ground – Public Sector Field Validation Funding Opportunity Announcement in September 2020. In January 2021, U.S. DOE announced that OEP was one of seven state and local government entities, and one of just two SEOs, chosen to establish "proving grounds" for advanced building technologies by installing and evaluating promising building technologies and systems in commercial and multi-family buildings. OEP will partner with a Johnson City startup, Stone Mountain Technologies, Inc. (SMTI), NASEO, and TAEBEC to validate SMTI's novel, thermally-driven heat pump technology for high efficiency heating applications. The project, dubbed "HEATER" (Highly Efficient gas Absorption Technology for Energy

Reductions), will install a prototype Gas Absorption Heat Pump at a public facility in order to document and verify energy savings and demonstrate applicability in public buildings. Oak Ridge National Laboratory will serve as a technical advisor on the project. This award is a critical step toward commercialization and deployment of this Tennessee-developed technology.

Boards, Councils, and Working Groups

OEP engages with stakeholders from federal, state, and local government, utility sectors, as well as with other SEOs and non-governmental organizations (NGOs), on topics related to strategic energy planning:

- The OEP Director serves as the Governor's designee to the State Energy Policy Council, the TDEC Commissioner's designee to the Energy Efficient Schools Council, and as the SEO representative on the Tennessee Housing Development Agency's Energy Efficiency and Weatherization Advisory Board.
- The OEP Energy Programs Administrator for SEP / Energy in Transportation / OEP Communications serves as the Governor's designee on the TVA Regional Energy Resource Council, a TDEC representative on the TVA Connected Communities Steering Committee, the TDEC representative on the Nashville Mayor's Sustainability Advisory Committee, and on the Executive Board for Urban Green Lab, a sustainability education non-profit serving the greater Nashville area.

Workshops, Presentations, and Speaking Engagements

OEP staff presented at various workshops and conferences to promote programs, funding and technical assistance opportunities, initiatives, and U.S. DOE efforts. Examples include the Tennessee Renewable Energy Economic Development Council's Renewable Energy Summit, the TAEBEC Annual Meeting, and several other state and regional speaking engagements.

Additionally, OEP assisted in planning, promoting, and executing the 2020 Tennessee Valley Solar Conference, hosted by the state chapter of the Solar Energy Industries Association, TenneSEIA. The event took place on October 7 in Franklin; as part of the event, OEP's Senior Energy Consultant prepared a three-speaker panel on distributed energy resources, associated renewable energy, and energy storage opportunities in the state.

State Energy Office Collaboration

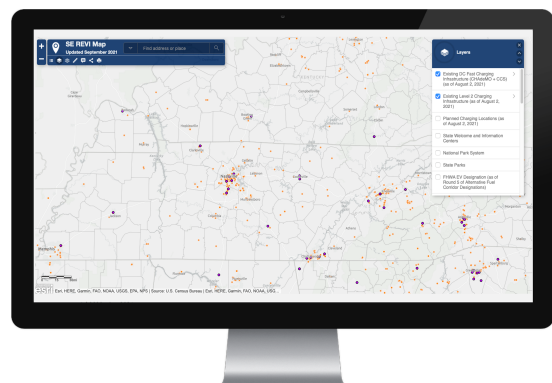
Southeast Regional EV Information Exchange (SE REVI)

During Program Year 2020-2021, OEP founded and led SE REVI, which is comprised of Southeastern SEOs that acknowledge the following key regional opportunities associated with electric vehicles and seek to collectively foster the growth of electric vehicle adoption within the region:

- Increased deployment of electric vehicles can benefit the Southeast by providing new economic opportunities, reducing transportation costs for households and businesses, increasing mobility options, allowing the convenience of charging at home and at work, meeting air quality standards, and reducing greenhouse gas emissions;
- The Southeast is home to a strong automotive sector that includes headquarters, auto parts manufacturing, and assembly plants;
- Facilitating access to electric vehicles and charging infrastructure supports the tourism and recreation sectors in the Southeast, including in small towns and rural or underserved communities;
- Equitable access to electric vehicles and charging infrastructure ensures that the economic and environmental benefits of electric vehicles accrue to communities that are rural, economically disadvantaged or underserved, disproportionately burdened by environmental impacts, or are otherwise vulnerable;
- Electric vehicles can contribute to building a safer, cleaner, more affordable, and more resilient transportation system that reduces fuel imports and keeps energy dollars in state;
- Supporting the growth and development of cross-state compatibility in electric vehicle infrastructure can contribute to a safer, cleaner, more affordable, and more resilient transportation system; and
- Regional collaboration is mutually beneficial to residents and businesses in participating states, as it can promote a seamless, cross-state driving experience; increase public awareness of electric vehicles; and facilitate the sharing of best practices.

OEP coordinated with NASEO, the Duke Nicholas Institute, and other Southeastern SEOs to convene bi-monthly meetings for SE REVI. During these meetings, the group reported out on two projects of priority: 1) the completion of an infrastructure mapping exercise and identification of priority corridor gaps/connections and 2) development of an electric vehicle infrastructure planning document archive by NASEO, which the group could use to store documents on the siting and securing of electric vehicle charging infrastructure site hosts, permitting, pricing, signage, minimum operating standards, accessibility, and ownership models.

OEP coordinated completion of SE REVI's infrastructure mapping exercise for the Southeast. The [public-facing, interactive map](#) was finalized and published in September 2021. OEP staff presented on a NASEO-hosted webinar that month to demonstrate the map and its various layers to key stakeholders (e.g., State Departments of Transportation, non-profits, infrastructure developers, local governments, Clean Cities coalitions, etc.). Since its launch, the map has been viewed over 1,000 times and has been recognized as a critical regional resource for electric vehicle infrastructure planning.



SE REVI Map showing Tennessee's Existing DC Fast Charging Infrastructure and Existing Level 2 Charging Infrastructure (as of August 2, 2021)

SEP Market Title Project

OEP led a series of conversations and workshopping sessions with NASEO, multiple SEOs (Alabama, Arkansas, Kentucky, Florida, Idaho, New York, Oregon, Pennsylvania, Tennessee, Texas, Washington, and Wisconsin), and U.S. DOE to work through and propose improvements and modifications to the naming conventions and framework for reporting out on activities funded by SEP. OEP led in the development of an associated guidance document, which complements an update to SEP's reporting system known as Performance and Accountability for Grants in Energy (PAGE) and provides definitions, descriptions, and/or examples. The document also included example crosswalks to demonstrate how to navigate the enhanced PAGE structure. The goal of this effort was to streamline and restructure the PAGE reporting system to generate consistency and to allow U.S. DOE to better capture related statistics on programs, funding allocations, and activities.

As a result of this work, U.S. DOE can now sort and filter SEP-funded activities by nine activity types, 24 sector types, and 41 technology and/or topic areas. These schemas were designed to capture the overarching activities in which SEOs engage, the sectors that are impacted, and the technologies and/or topic areas of focus of SEO-administered programs. This new framework ensures that emerging state policies and programs are uniformly captured, and that best practices and replicable models can be more readily shared among all SEOs.

National Association of State Energy Officials (NASEO) Engagement

NASEO is the only national non-profit association for the governor-designated energy officials from each of the 56 states and territories. Formed by the states in 1986, NASEO facilitates peer learning among state energy officials, serves as a resource for and about state energy offices, and advocates the interests of the SEOs to Congress and federal agencies. Throughout the Program Year, OEP supported NASEO through membership dues and through participation on the NASEO Board and on several committees:

- The OEP Director serves as Treasurer for the Executive Committee of the NASEO Board of Directors.
- The OEP Energy Programs Administrator for Energy Security / Critical Infrastructure serves as Co-Chair on the NASEO Energy Security Committee, the OEP Energy Programs Administrator for SEP / Energy in Transportation / OEP Communications serves as the Co-Chair for the NASEO Transportation Committee, the OEP Deputy Director serves on the NASEO Energy Equity Taskforce, and the OEP Senior Consultant for Strategic Energy Initiatives participated in the NASEO Grid Interactive Efficient Buildings Working Group.
- The OEP Director serves as a "state advisor" for the NASEO / NACAA VW Diesel Settlement Working Group, which enables state-to-state communication on the VW Settlement Environmental Mitigation Trust.



STATE FACILITY UTILITY MANAGEMENT

To maximize utility savings opportunities for State facilities, the State building energy management statutory responsibilities for State-owned and managed properties (Tenn. Code Ann. §§ 4-3-1012 and 4-3-1017-1019) were transferred from Department of General Services (DGS) to TDEC OEP via Executive Order No. 63 on January 1, 2017. A new section, State Facility Utility Management (SFUM), was formed under OEP.

SFUM strives to provide actionable utility insights to State facilities, enabling them to make informed decisions that optimize their facility energy consumption as well as their associated utility savings. To support this goal, SFUM administers several utility savings and building energy management initiatives, including the following:

- Development, maintenance, and end-user training for an online Utility Data Management (UDM) platform for approximately 78 General Government agencies and Higher Education campuses since the acquisition of UT Southern by the University of Tennessee (UT) System in July 2021.
- Publication of an annual Utility Data Analysis Report that provides in-depth utility usage, cost data, and utility analysis for State-owned and managed properties. The report also highlights case study examples of UDM platform features and benefits for General Government agencies and Higher Education campuses.
- Oversight of energy efficiency projects under the EmPower TN initiative, designed to reduce energy consumption and utility costs for participating State facilities through the implementation of energy conservation measures and/or energy efficient technologies.
- Provision of no-cost technical assistance programs and support to State agencies and public Higher Education facilities to promote the implementation of energy management, energy efficiency, and/or renewable energy projects that meet the needs, budgets, and priorities of participating entities.



Utility Data Management Platform Overview

The UDM platform serves as a central repository for the historical and ongoing utility cost and usage data⁴ of approximately 8,800 State-owned and -managed facilities, representing approximately 109 million square feet of building space. The platform is predominantly used for utility tracking, reporting, and benchmarking for General Government agencies and Higher Education institutions as well as for bill payment integration for General Government agencies. UDM serves the 78 General Government agencies⁵ and Higher Education public institutions and contains data regarding approximately 8,898 accounts and 10,699 utility meters.

Summary of State Commodity Use Costs for Fiscal Year 2021*

Commodity	Use	Cost
Electric	1,184,629,060 kWh	\$110,538,711
Water & Sewer	3,150,186 Kgal	\$33,376,558
Natural Gas	51,335,583 THERM	\$24,033,884
Chilled Water	17,563,426 Ton Hr	\$4,155,212
Steam	191,102 MLB	\$2,793,515
Propane	466,842 THERM	\$615,148
Total		\$175,513,029

*Costs and usage for Fiscal Year 2021 are subject to change should additional billing data be obtained. These figures do not include all propane commodity use costs, as some agencies procure the fuel via purchase orders that are processed outside of the UDM platform.

Since launching the UDM platform in 2019, the SFUM team has provided aggregated utility usage and cost data for these facilities to help fiscal personnel, State building maintenance staff, utility and facility managers, sustainability professionals, and technical assistance providers gain actionable insights into their utility data. Before the launch of the UDM platform, obtaining this data required significant effort to locate utility accounts, gather utility bills, and manually enter data. As a result, utility cost and usage data were rarely analyzed by State personnel.

The SFUM team's successful integration of the UDM platform into the General Government's bill payment system, Edison, continues to support remote work and workplace flexibility for General Government agency accounts payable staff through automated bill entry and by allowing multiple users to simultaneously perform online bill review, approval, and editing. Additionally, the platform facilitates team collaboration through the use of bill notes, assigned flags, shared dashboards, and reporting. The UDM platform's ability to track, record, and date individual user activities has been able to accommodate remote and alternative workplace solutions for most fiscal departments during the ongoing COVID-19 pandemic.

The SFUM team provides ongoing data quality control of the UDM platform for both General Government agencies and Higher Education institutions to address data gaps, identify new or inactive accounts, verify meter serial numbers and rate schedules, correct bill service dates, unit of measurement disagreements, and cost adjustments, in addition to ensuring that meters are assigned to their correct buildings and that associated building stock information (e.g., building names, address, longitude/latitude, square footage, construction date, and use type) is updated accordingly.

4. Cost and usage data for most utilities are predominately captured monthly. Some utility bills are captured on a quarterly or other basis.

5. For FY2021, the UDM platform contains utility bill data for 99.93% of the utility meters (as of January 7, 2021) that have been identified for General Government agencies and Higher Education institutions.

In addition to UDM platform maintenance, SFUM continues to administer remote and in-person UDM trainings and presentations for new and existing platform users. Throughout the Program Year, the SFUM team conducted 13 in-person or remote trainings on the UDM platform covering topics such as platform navigation, reporting, dashboards, and bill processing to strengthen end-user familiarity, knowledge, and utilization of the UDM platform for more than 93 facility managers, accounts payable personnel, and sustainability professionals within State service.

Utility Data Analysis Report

The overarching goal of the Utility Data Analysis report is to communicate the State’s utility cost and consumption to a broader audience and to underscore the capabilities and benefits of the UDM platform, which has facilitated the transition away from manual data collection, entry, and analysis. The report compares utility usage data for the current and prior Fiscal Year across the four organizational groups: General Government; the University of Tennessee (UT) System; Tennessee Board of Regents (TBR); and Locally Governed Institutions (LGIs). It also provides data on the six types of utility commodities: electric power (electric), water/sewer, natural gas, chilled water, steam, and propane.

- The chief benefits of UDM platform utilization for facility managers, accounting staff, and administrators alike is the value-added abilities to:
- Remotely track, benchmark, and report utility usage
 - Accommodate remote and alternative workplace solutions
 - Easily identify billing discrepancies
 - Automate bill entry to reduce human errors occurring from manual bill entry as well as time spent manually entering bills, and
 - Provide greater accountability and capability for cross-functional collaboration.

Several case studies included in the FY2020 report⁶ highlight the successful integration of the UDM platform used in State General Government operations. For example, the UDM platform has assisted in tracking savings at the William R. Snodgrass Tennessee Tower office building following the execution of various energy conservation measures (ECM). Other examples include the leveraging of UDM data to promote change where high usage and costs were visible at Cove Lake State Park and the detection of abnormal increases in energy and water use by the Department of Correction and the Department of Military.

Work on the FY2021 report has already begun, and the SFUM team anticipates a Summer 2022 distribution. In the meantime, the SFUM team is continuing to provide technical assistance and additional training opportunities to UDM end-users (e.g., State fiscal personnel, utility and facility managers and building maintenance personnel, sustainability professionals) from across the State to maximize the utilization of UDM.

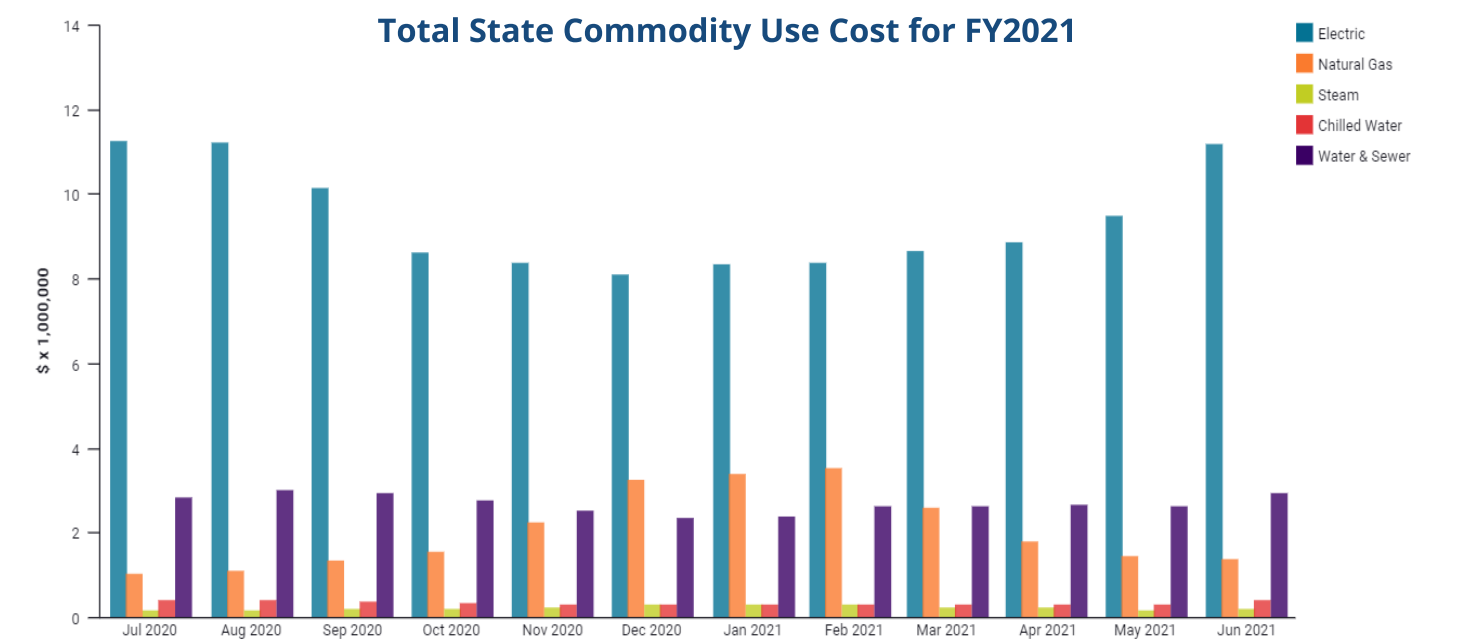
UDM Platform Utilization & Technical Assistance

The SFUM team and UDM end-users continue to utilize the UDM platform to assist in the tracking, development, and validation of ECM projects and fulfillment of technical assistance requests involving billing errors (overbilling), meter issues, energy spikes, water leaks, and unauthorized charges such as charitable contribution charges and taxes. General Government agencies have been able to recoup over \$15,135 in utility cost reimbursements due to utility issues identified by the UDM platform.

Example of Water Leak Detection: Morristown National Guard Armory

An existing water leak at Morristown National Guard Armory was brought to the attention of the

6. FY2020 Utility Data Analysis Report, www.tn.gov/environment/UDM.



Department of Military's Energy Manager because of a UDM bill audit, in which abnormally high-water usage and costs were identified. The average water usage for this meter increased from 500 HGal to over 1,000 HGals for two consecutive months, which prompted the Energy Manager to contact the maintenance zone manager for that location to investigate the cause for the uptick in water consumption. The zone manager was able to identify the source of the water leak and fix it promptly, preventing the State from incurring additional water cost overages. Military AP staff received an adjustment credit on their next bill from Russellville-Whitesburg Utility District for \$1,584 for the period of the water leak.

Example of UDM Data Being Used for ECM Validation: Ellington Agriculture Center & Fleming Training Center

SFUM received a public records request from Engineering Services Group (ESG) on behalf of the Tennessee Wildlife Resource Agency (TWRA) and DGS for utility billing data from the Ellington Agriculture Center and the Fleming Training Center. ESG had been contracted by TWRA and DGS to review the energy savings for each building following the completion of mechanical and electrical upgrades at the Ellington Agriculture Center in 2016 and at the Fleming Training Center in 2017. SFUM provided ESG monthly cost and consumption data from the UDM platform as well as two trend reports showing a decrease in monthly costs since the HVAC and lighting upgrades.

EmPower TN

The Tennessee General Assembly appropriated \$37.5 million in FY 2016 funding for EmPower TN energy efficiency projects in State-owned and managed facilities. SFUM, in coordination with implementing agencies and campuses and the capital projects groups under DGS, UT, and TBR, is responsible for monitoring the progress of these projects and providing technical assistance to ensure successful completion.

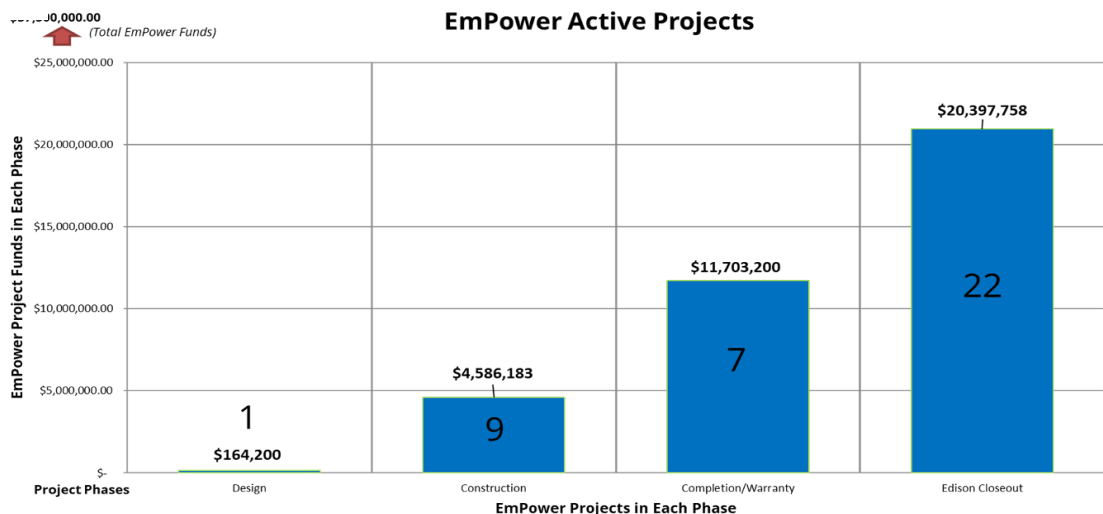
As of October 2021, \$37,398,599 has been obligated to 39 projects under the General Government, UT, and TBR real estate portfolios. The projects' cumulative estimated annual energy savings is \$4,365,295. The

projects' cumulative average simple payback (EmPower funding/total estimated annual energy cost saved) is 8.6 years. (The obligated dollar amount, estimated annual energy savings, and average simple payback are based on the projections from the original EmPower TN applications that were submitted to and approved by the State Building Commission for all 39 energy efficiency projects. Average simple payback based on actual spend / annual energy savings cannot be reported until all projects have been completed, closed out in Edison, and have gone through post-project measurement and verification).

The following bar chart highlights the progress of the EmPower TN projects through each phase of the capital project process and is current as of the end of the Program Year 2020-2021. The left-hand side of the graph references the EmPower TN energy efficiency allocation of \$37.5M, and each bar represents the total number of projects and the dollar amount for each phase.

All EmPower TN energy efficiency project savings are measured and verified. For certain projects, the SFUM team is working with TVA's contractor, TRC Companies, to determine energy usage baselines and create detailed energy surveys (DES). Each DES is specific to the individual project and ECM. Baseline physical conditions (energy consumption, control strategies, equipment inventory and conditions, occupancy, nameplate data, etc.) are identified through inspections, short-term metering activities, spot measurements, and surveys. The baseline conditions will be used to determine estimated savings by comparing the baseline energy use to the post-installation energy use.

Throughout the Program Year, TVA's third-party contractor focused their resources on completing the post-measurement and verification analysis, modeling, and reporting for several outstanding projects from last year's reporting cycle that had completed their site visits but had not received a final post-measurement and verification evaluation report. TRC plans to schedule and complete post-measurement and verification audits during the next Program Year.



NES Enel X Demand Response Program

DGS, in collaboration with Nashville Electric Service, has continued to implement the Enel X Demand Response Program (previously known as EnerNOC) in ten major State office buildings. Each of these buildings has an Energy Management System that allows automation of ECMs to meet the target demand reduction. During a demand reduction event, these buildings reset space temperature set-points, shut off non-essential lighting, manually curtail select air conditioning units, and/or voluntarily shed non-essential loads, such as lighting, printers, etc.

The Enel X program not only saves the State money, but also serves as a revenue stream to help offset the cost of utility expenses. This program is a valuable introduction into automatic demand reduction. The figure below depicts the energy savings realized through December 2021 from energy reduction and continued participation in the Enel X Demand Response Program, as evaluated by the SFUM team.

Energy Liaison Program

During the Program Year, OEP began working with Milepost Consulting to assist with the development of its Energy Liaison Program (ELP), per Tenn. Code Ann. § 4-3-1018, to include:

- Educational workshops;
- Technical training in operations and maintenance (topics driven by liaison input);
- Peer-focused information exchange; and
- Identification and inventory buildout for current building technologies.

Milepost created a Market Research Summary report for ELP program design, and efforts relating to ELP workplan development and focus group research will continue into the next Program Year.

Existing Building Commissioning

Existing Building Commissioning (EBCx) refers to the commissioning process of system performance optimization to existing buildings, providing assessment of a building's current use and performance. Taking this data into consideration, operational optimization modifications, including controls-based ECMs for the existing HVAC and lighting systems, are then proposed, which can result in the avoidance of significant energy costs and the improvement of occupant comfort and productivity. All building systems suffer decreased energy efficiency performance due to age, unnoticed wear and tear, and potential change of facility function. Ongoing commissioning, as part of DGS's facility maintenance budget, is expected to monitor HVAC and lighting trend data to identify maintenance issues and operational drift before these systems significantly deviate from the optimal operating standards. Monitoring these effects is an integral part of EBCx, which allows the State to maintain high building performance.

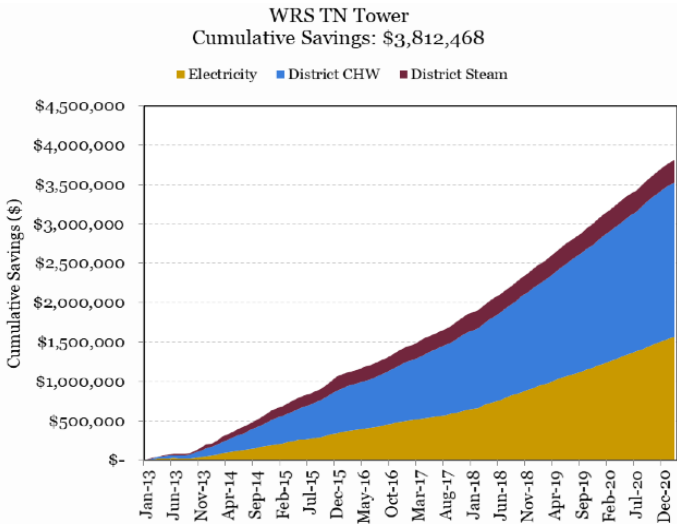
Enel X Demand Response Program Savings



Example Project: William R. Snodgrass Tennessee Tower Office Building

The William R. Snodgrass Tennessee Tower Office Building has participated in EBCx longer than any other State facility, dating back to January 2013. The building has received various energy efficiency upgrades, including the installation of LED lighting and controls and upgraded mechanical systems (e.g., the installation of energy smart digital valves with controls integrated into the building automation system, fan walls and high efficiency air handling units with heat recovery, etc.). EBCx was performed onsite to extend current equipment life and optimize the chilled water system, building automation system, lighting system, and overall energy performance. Although the building saw a doubling of its occupancy prior to the COVID-19 pandemic—from 1,000 employees in 2013 to 2,000 employees by early 2020—the building has realized substantial savings. Its total estimated energy-related cost savings for the period of January 2013 through February 2021 was \$3,812,468. In total, approximately 41% for the cumulative savings came from electricity, 51% came from district chilled water, and 8% came from district steam. Over the same period, approximately 31,319 megatons of CO2e emissions were avoided as a result of the installed ECMs and ongoing EBCx process. This cumulative total reduction in greenhouse gas emissions is equivalent to the annual removal of 6,594 cars from the road, or the powering of 2,855 fewer homes for a year.

Monthly Cumulative Savings Based on Actual Prices through February 2021



EBCx Impact at William R. Snodgrass Tennessee Tower Office Building:

 **31k**
megatons of CO2e avoided

 **\$3.8M+**
saved over eight years

Example Project: Northeast State Community College (Wayne Basler Library)

Several EmPower TN projects featuring LED and wireless LCS upgrades reached substantial completion during Program Year 2020-2021, while previously completed projects continued to benefit from energy-related cost savings. One such project was completed in January 2020 at the Wayne Basler Library located on Northeast State Community College's campus in Blountville, TN. The facility managers initially upgraded the building's lighting with LEDs and controls. In addition to replacing the lighting system for the building with more efficient lighting and controls, Northeast State Community college continues to see tremendous cost savings through ongoing optimization of said controls, wherein facilities staff periodically assess and adjust the LCS based on facility operational needs. Third-party post-installation site measurement and verification estimates that the implementation of the lighting upgrades and controls at the Wayne Basler Library have generated a lighting electricity savings of 162,821 kWh and an interactive energy savings of 30,937 kWh for a total annual energy savings of 193,758 kWh, or \$17,826.

EBCx Impact at Northeast State Community College, Wayne Basler Library:

 **193k**
kWh of annual energy savings

 **\$17k+**
annual savings



(Above) After pictures of the lobby and library in the Wayne Basler Library undergoing LCS and LED upgrades
(Below) Before and after pictures of a classroom in the Wayne Basler Library undergoing LCS and LED upgrades



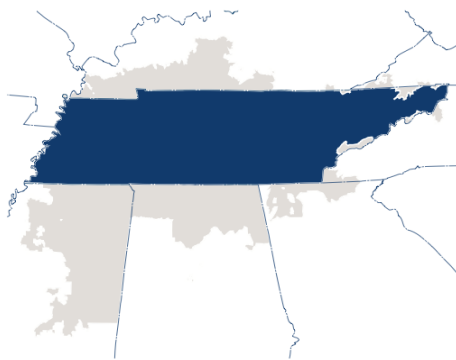


TENNESSEE'S ENERGY, EMISSIONS, AND EMPLOYMENT PROFILE

Tennessee is unique in the energy utility sector in that TVA, a federally-owned corporation, provides electricity to approximately 99.7% of the electricity service territory in the state. TVA is self-regulated with regard to fuel mix and associated power generation. The images below are taken from TVA's "TVA in Tennessee" fact sheet.

Service Area

*TVA serves virtually all of the 95 counties in Tennessee.



49%
of total
service area



TVA Covers
42,028 square miles
of Tennessee*

22,514 square miles
Watershed
Management

Energy Sales

Sold
94.1 billion
kilowatt-hours of electricity to
60 municipals and 22 co-ops

Provided
41 billion
kilowatt-hours of electricity
to 2.9 million households
through the LPCs

Served
47 billion
kilowatt-hours of electricity
to 487,000 commercial
and industrial customers*
through the LPCs

Home to
23 direct-served
customers purchasing
6.4 billion
kilowatt-hours of electricity

Revenue
\$6.8 billion
power revenue in Tennessee
2021 | about 66% of TVA
total operating revenue

*1.03 billion kilowatt-hours to outdoor lighting
customers. LPC = local power company

The following bullets highlight a few key facts about the energy sector in Tennessee.

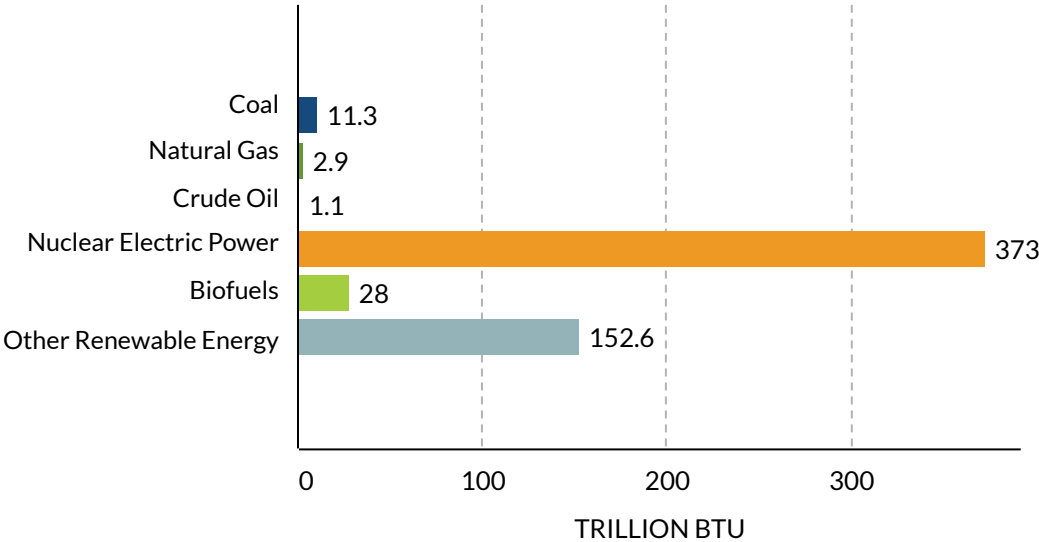
- TVA operates 19 hydroelectric dams, four coal-fired power plants, two nuclear power plants, seven combustion turbine sites, and a pumped storage facility, all with a combined generating capacity of more than 19,655 megawatts (MW).
- Unit 2 of the Watts Bar power plant entered service in 2016, becoming the nation's first new nuclear reactor in the 21st century. Tennessee's two nuclear power plants provided 47% of in-state electricity in 2020.
- TVA's 1,616 MW Raccoon Mountain pumped storage plant, which began operating in 1978, is the third-largest pumped storage hydroelectric facility in the U.S.; Tennessee is the largest ethanol-producing state in the Southeast and was the 14th-largest ethanol producer in the nation in 2020.
- The state's largest solar facility, a 53 MW installation in Millington, came online in December 2018. However, 2020 and 2021 saw an unprecedented level of activity and preparation for future solar development, thanks in large part to TVA's new [Green Invest program](#) and its leveraging of long-term agreements to build large-scale renewable energy installations in the Valley for some of the power generator's largest industrial and utility customers. Under this program, 778 MW of Tennessee-based solar contracts with TVA were announced in 2020, with projects ready for power generation and transmission by 2023.
- The average price for electricity per kWh across all sectors in Tennessee is below the national average, and the average price for the residential sector alone is among the lowest 10 states. About 6 out of 10 households in Tennessee use electricity as their primary energy source for home heating.



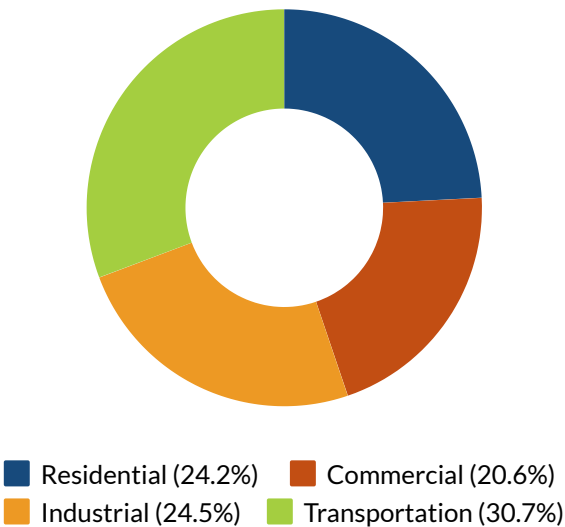
Energy Consumption and Production

U.S. Energy Information Administration (EIA) maintains some of the most comprehensive state-specific data on energy consumption, production, prices, and expenditures by source and sector. The following graphs detail Tennessee's energy production estimates, energy consumption by end-use sector, and energy consumption estimates for calendar year 2019. For additional information and data on Tennessee, please visit <https://www.eia.gov/state/?sid=TN>.

2019 Energy Production Estimates in Tennessee



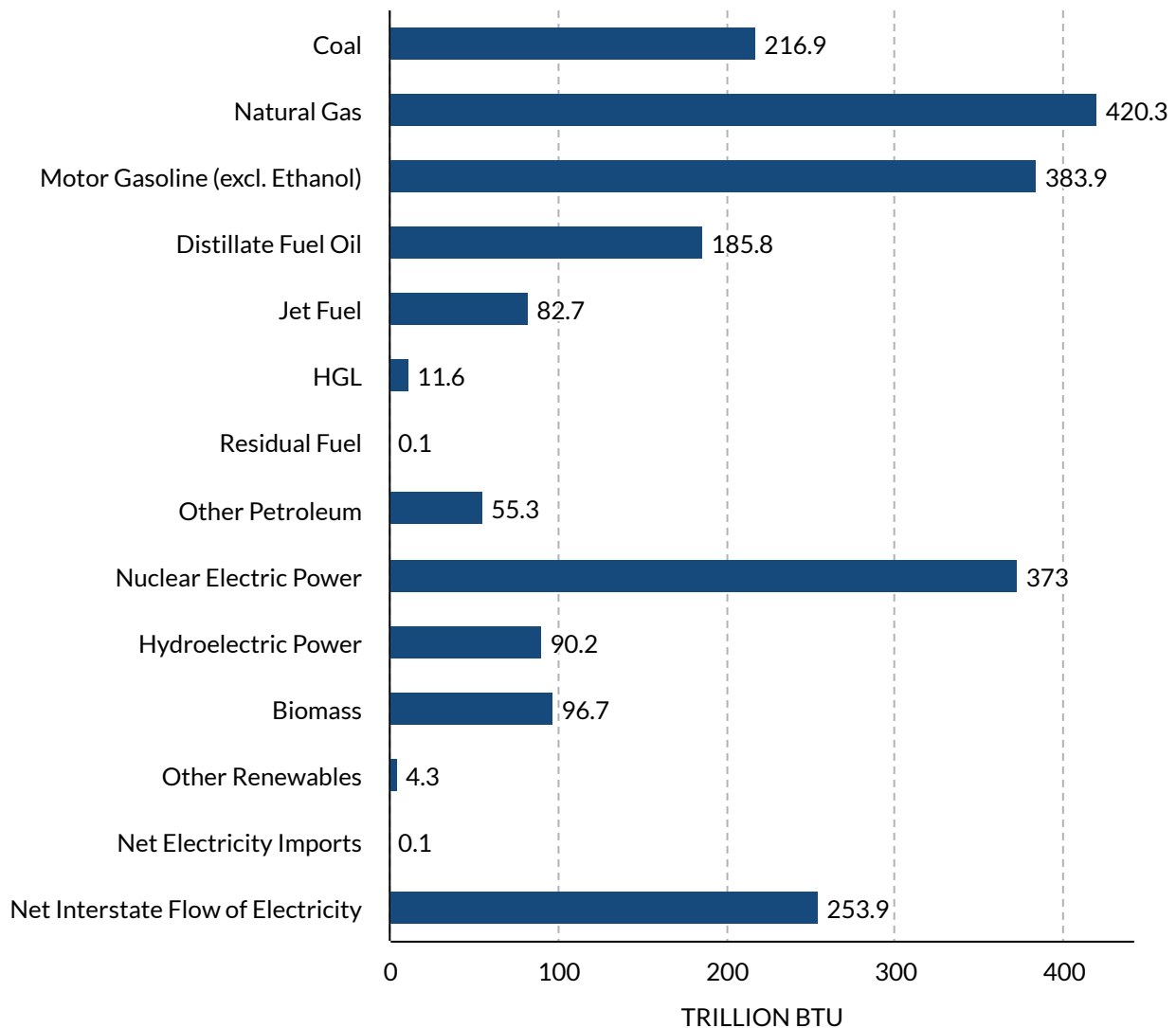
2019 Energy Consumption by End-Use Sector in Tennessee



7. Data from two years prior is finalized by the EIA annually, typically in the third quarter of the calendar year.



2019 Energy Consumption Estimates in Tennessee



According to the 2020 Southern Regional Energy Profiles Report,⁸ published by the Southern States Energy Board, Tennessee is among the top 15 states in total electricity consumption for all sectors combined, and among the top five states in residential electricity consumption per capita. The report also contextualizes the state's overall energy consumption performance:

- Long travel distances across Tennessee, combined with the state's role as a logistics hub, contribute to the transportation sector accounting for about 30% of the state's total energy consumption.
- Manufacturing is a leading component of the state's economy; as such, the industrial sector uses only slightly less energy than the transportation sector. The industrial activities that make the largest contributions to Tennessee's gross domestic product include the manufacture of chemicals; computers and electronic products; food, beverages, and tobacco products; motor vehicles and automotive parts; and petroleum and coal products.
- The residential sector, where both heating and air conditioning are widely used, accounts for almost 25% of the state's total energy consumption.

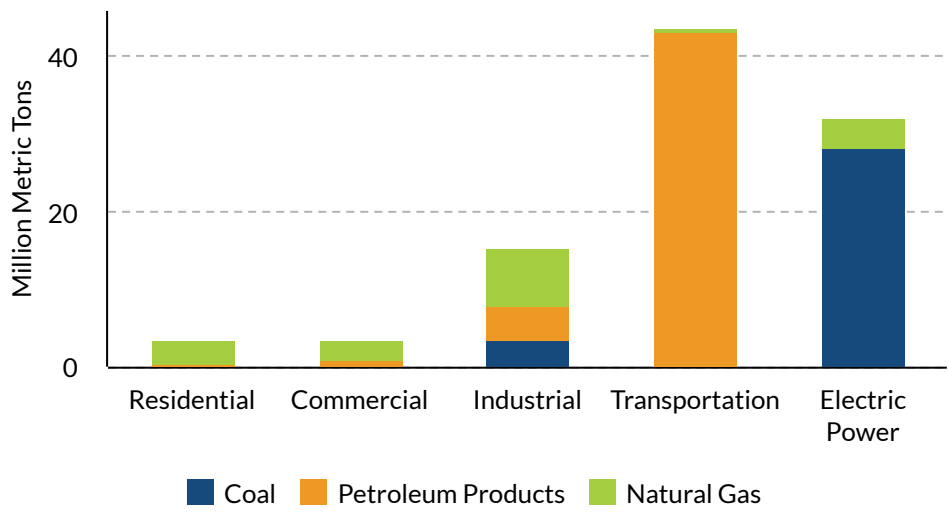
8. The Southern States Energy Board updates this report regularly with data from EIA. The 2020 report can be accessed at https://www.sseb.org/wp-content/uploads/2020/09/Southern_Energy_Profiles2020_web.pdf.



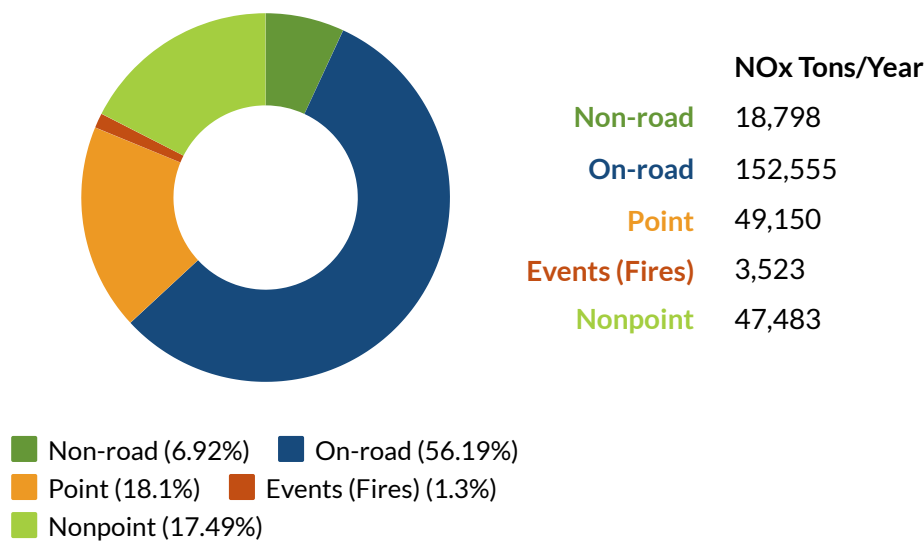
Energy Sector Emissions

Statewide emissions data associated with energy consumption can be found through both EIA and the National Emissions Inventory (NEI).⁹

2017 Carbon Dioxide Emissions from Fossil Fuel Consumption in Tennessee



2017 NOx Emissions (Tons/Year) by Source Sector in Tennessee



⁹ Aggregated data from two years prior is typically finalized by EPA every three years. The NEI can be accessed at <https://www.epa.gov/air-emissionsinventories/national-emissions-inventory-nei>.

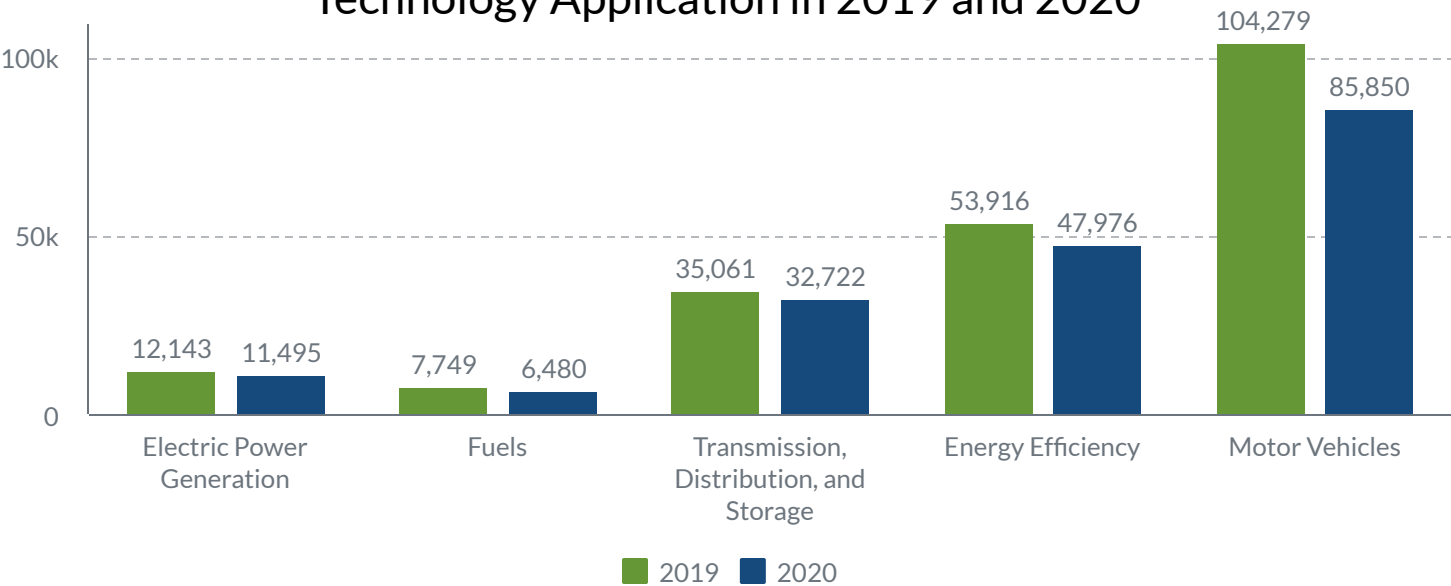


Energy Sector Employment

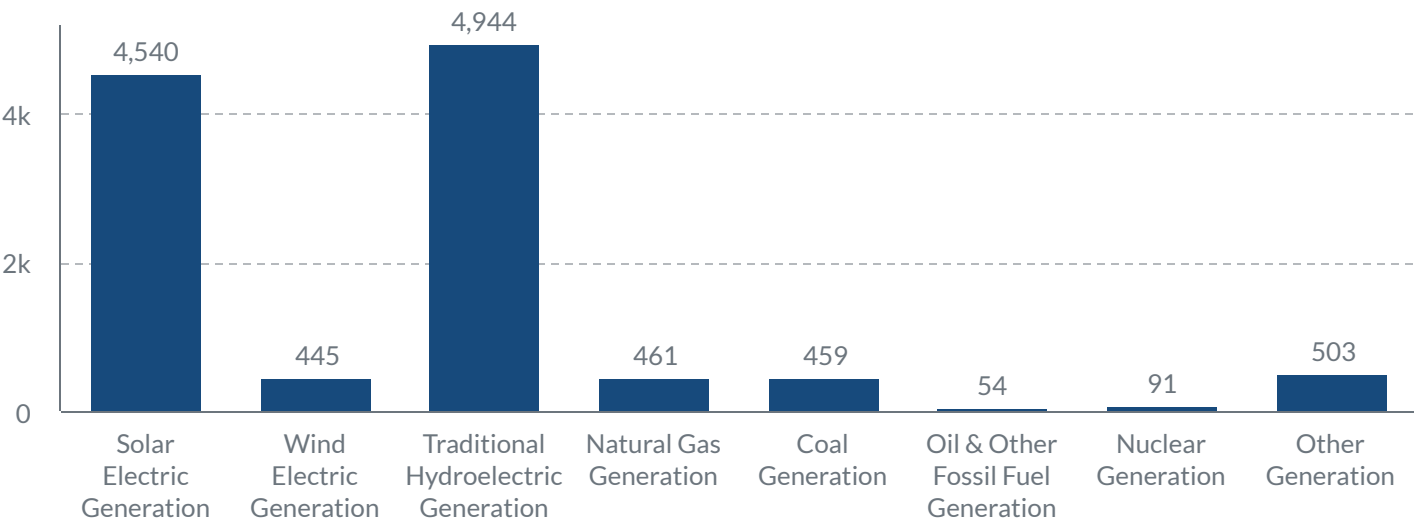
According to the 2021 U.S. Energy and Employment Report (USEER),¹⁰ jointly compiled by NASEO and the Energy Futures Initiative, Tennessee’s energy sector employed more than 185,000 workers in 2020:

- Traditional Energy employed 50,697 workers (1.6% of all U.S. Traditional Energy jobs):
 - 11,495 workers in Electric Power Generation
 - 6,480 workers in Fuels
 - 32,722 workers in Transmission, Distribution, and Storage
- Energy Efficiency employed 47,976 workers (2.3% of all U.S. Energy Efficiency jobs)
- Motor Vehicles employed 85,850 workers (3.7% of all U.S. Motor Vehicle jobs)

Tennessee Employment by Major Energy Technology Application in 2019 and 2020



Tennessee Electric Power Generation Employment by Detailed Technology Application in 2020



10. To access the USEER, please visit <https://www.usenergyjobs.org/>.



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IMAGE ATTRIBUTION

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